

Recommended Record of Decision of the District Commander

On Permit Application Number 93-0902-12
Submitted by the City of Newport News
on Behalf of the Regional Raw Water Study Group

For the King William Reservoir Project
on Cohoke Creek in King William County, Virginia



**US Army Corps
of Engineers®**

Norfolk District
803 Front Street
Norfolk, Virginia 23510-1096

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DEPARTMENT OF THE ARMY

NORFOLK DISTRICT, CORPS OF ENGINEERS
FORT NORFOLK, 803 FRONT STREET
NORFOLK, VIRGINIA 23510-1096

REPLY TO
ATTENTION OF

CENAO-TS-G

20 March 2001

MEMORANDUM FOR Commander, North Atlantic Division, ATTN: CENAD-CO-R

SUBJECT: Recommended Record of Decision of the District Commander on Permit Application 93-0902-12 submitted by the City of Newport News on behalf of the Regional Raw Water Study Group to construct the King William Reservoir Project on Cohoke Creek in King William County, Virginia.

1. Name of Applicant: The City of Newport News, acting on behalf of a group of municipalities known as the Regional Raw Water Study Group (RRWSG), c/o Mr. R. W. Hildebrandt, Assistant City Manager, 2400 Washington Avenue, Newport News, Virginia 23607. The terms RRWSG, the City of Newport News, Newport News Waterworks, the project proponent, and the applicant are all used in this document. These terms are generally interchangeable, but in some cases it was difficult to determine if submittals by the City of Newport News or Newport News Waterworks were made on their own or on behalf of the RRWSG.

2. Location, Description and Purpose of the Proposed Activity:

a. Location: The proposed King William Reservoir would be located in Cohoke Creek (also known as Cohoke Mill Creek), a tributary to the Pamunkey River, in King William County, Virginia. Cohoke Creek lies in a deeply incised valley between the Mattaponi and Pamunkey Rivers, which join at West Point, Virginia to form the York River. The reservoir would be generally located between State Route 30 to the north, County Route 630 to the east, County Route 626 to the south and County Route 633 to the west, in a rural area known locally as Pamunkey Neck. The proposed raw water intake and pumping station would be located at Scotland Landing, in the freshwater tidal portion of the Mattaponi River, a tributary to the York River in King William County, Virginia (see Map 1 - Project Vicinity Map).

b. Description: The proposal involves the withdrawal of water from the Mattaponi River, pumpover to a reservoir created by impounding the upper half of Cohoke Creek, and the transmission of the water by underground pipeline to the Newport News Waterworks' existing water supply system. The project consists of the following activities requiring Department of the Army authorization:

(1) Impoundment: A 78-foot high by 1,700-foot long earthen dam would be constructed on Cohoke Creek, approximately 3.5 miles upstream of the existing Cohoke Mill Pond dam and 0.2 miles downstream of the Route 626 crossing of Cohoke Creek to provide a raw water storage reservoir. The reservoir would impound a surface area of approximately 1,526 acres at a normal water surface elevation of 96 feet at mean sea level to provide a storage volume of approximately 12.2 billion gallons. The reservoir pool area would be clearcut logged up to elevation 90 feet at mean sea level. Approximately 100,000 cubic yards of material would be excavated from vegetated wetlands in order to remove unsuitable organic soils for the preparation of the dam footprint. The downstream toe of the dam and the

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spillway discharge channel would be protected by riprap. The existing Cohoke Creek crossing of County Route 626 would be relocated to the top of the dam structure. The impoundment would involve the excavation, filling and displacement by flooding of 437 acres of waters of the United States consisting of 403 acres of palustrine forested, scrub-shrub and emergent wetlands and 34 acres of shallow open water. The construction of the impoundment would also inundate approximately 21 miles of free-flowing perennial and intermittent streams.

(2) Pipeline: A 50 million gallon per day (mgd) reservoir pump station would be constructed on the downstream side of the dam to pump raw water from the King William Reservoir through an estimated 11.7 miles of 42-inch and 48-inch diameter pipeline to Beaverdam Creek, a tributary to the Newport News Waterworks' existing Diascund Creek Reservoir in New Kent County. The construction of the pipeline would involve crossings of the Pamunkey River, Cohoke Creek near its confluence with the Pamunkey River, and 60 other perennial and/or intermittent streams and wetland areas. The 4,500-foot long submarine pipeline crossing of the Pamunkey River and adjacent wetlands would be accomplished by directional drilling methods to avoid disturbance of the river bottom and wetlands. A concrete emergency drain outfall structure and riprap slope protection apron would be constructed on the west bank of the Pamunkey River. Other pipeline crossings would be excavated and backfilled to pre-existing grades. The total area that would be impacted by the pipeline construction would be 113 acres including approximately 10.4 acres of wetlands/streams. Most of the affected stream and wetland areas are palustrine forested, broad-leaved deciduous wetlands. Construction and maintenance of the pipeline right-of-way would permanently convert forested wetlands to emergent and scrub-shrub wetlands.

(3) Outfall Structure: The pipeline would end at a pre-cast concrete outfall structure with a 30-foot long riprap apron on Beaverdam Creek approximately 0.3 miles west of the Interstate 64 bridge over Beaverdam Creek and 0.8 miles upstream of the normal pool area of Diascund Creek Reservoir. A 150-foot long discharge channel would be excavated to connect the outfall to the main channel of Beaverdam Creek. The outfall would be designed for a maximum discharge flow of 50 mgd. Approximately 0.15 acres of vegetated wetlands consisting of a mixture of palustrine forested, scrub-shrub, emergent and sub-emergent communities would be impacted by the outfall structure and the excavated channel. The existing Newport News Waterworks raw water transmission system would transport the raw water from the Diascund Creek Reservoir to terminal reservoirs and treatment plants.

(4) Intake Structure: Because the reservoir drainage area is so small (8.9 square miles), the project would also involve the construction of a raw water intake and pumping station with a withdrawal capacity of 75 million gallons per day (mgd) at Scotland Landing on the southern shore of the Mattaponi River approximately 24.2 river miles upstream of its mouth, and the construction of 1.5 miles of 54-inch, 75 mgd capacity transmission pipeline with an outfall at the upper end of the proposed reservoir. Approximately 6,000 cubic yards of material would be excavated from the river bottom to facilitate the installation of the intake structure and concrete foundation. The intake pipe will be encased in a concrete structure and backfilled with gravel and riprap. River withdrawals would be accomplished through twelve, 7-foot diameter wedge-wire intake screens arranged atop the foundation in a single row parallel to the shoreline approximately 140 feet channelward of mean high water. The screens would be designed with one-millimeter slot openings and a maximum through slot velocity of 0.25 feet per second to protect fish eggs and larvae from entrainment and impingement. Two 60-inch diameter intake lines would be installed using a microtunneling method which would not disturb the shoreline or bank. No wetlands would be impacted by the footprint of the proposed pumping station.

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Initial withdrawals of up to 75 million gallons of water per day (mgd) would be pumped from the Mattaponi River to the King William Reservoir for the purpose of filling the reservoir and would continue whenever the reservoir level drops below the normal pool elevation of 96 feet at mean sea level. However, river withdrawals would be restricted by a minimum instream flow requirement (MIF) to prohibit pumping during periods of low freshwater flow in the river. The applicant's proposed 40/20 MIF applies the 40 Tennant MIF during the higher flow months of December through May and the 20 Tennant MIF during the lower flow months of June through November.

(5) Pier and Boathouse: A 72-foot long pier with an enclosed boathouse would be constructed adjacent to the intake structure on the Mattaponi River to provide mooring and storage of a boat for use in water quality sampling and intake screen maintenance.

(6) Applicant's Proposed Compensation Plan: To compensate for the loss of wetlands within the dam and reservoir pool area, the RRWSG propose to establish replacement wetlands at a 2 to 1 ratio in several sites throughout the York River and Rappahannock River watersheds. The applicant has also proposed a stream restoration plan in Louisa County. The applicant's Mitigation Program, Fish and Wildlife Mitigation Plan also outlines other potential mitigation measures. The applicant's proposed mitigation plans are discussed in detail in Section 8 f of this document.

c. Purpose: The applicant's stated purpose is "To provide a dependable, long-term public water supply for the Lower Virginia Peninsula, in a manner which is not contrary to the overall public interest." The Regional Raw Water Study Group has stated that a new raw water supply which can increase the regional treated water delivery capacity by 39.8 mgd is required to satisfy projected demands through the year 2040 (changed by applicant in November 2000 to year 2050). In order to meet the projected need, Newport News Waterworks has proposed the King William Reservoir as their preferred alternative to supply 23.2 mgd of the projected treated water safe yield deficit. The RRWSG estimates that construction and filling of the reservoir would take about ten years. Fresh groundwater development (4.4 mgd), brackish groundwater desalination (5.7 mgd) and conservation measures/use restrictions (7.1 to 11.1 mgd) are the other three components of the applicant's proposed water supply plan.

The RRWSG is led and principally funded by the City of Newport News and its current members consist of the City of Newport News, the City of Williamsburg and York County. The Lower Virginia Peninsula jurisdictions to be served by the Regional Raw Water Study Group include the Cities of Newport News, Hampton and Poquoson, which compose the current Newport News Waterworks service area, the City of Williamsburg, and York and James City Counties. Although once a member of the RRWSG, James City County is currently a participant under the conditions of a Memorandum of Agreement with the City of Newport News. Within the RRWSG service area are four military installations. Fort Eustis, located in Newport News and the Yorktown Naval Weapons Station, located in York County, rely on Newport News Waterworks for all of their water supplies. Langley Air Force Base and Fort Monroe, both located in Hampton, obtain their water supplies from Fort Monroe's Big Bethel Reservoir, but rely on Newport News Waterworks for emergency supplies. The applicant's projected 39.8 mgd deficit is broken down as follows: Newport News Waterworks service area = 32.8 mgd, Williamsburg = 1.5 mgd, York County = 1.1 mgd and James City County = 4.4 mgd (see Map 2 - Regional Map).

The City of Newport News Waterworks would receive 82% of the safe yield. Seven mgd or 18% of the safe yield would be supplied to the other members. While not members of the Regional Raw Water Study Group or a part of the RRWSG service area, King William County and New Kent County are host

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communities for the reservoir and pipeline, respectively. If the King William Reservoir were built, the host agreements with these localities provide a 3 mgd allowance of raw water for King William County and a 1 mgd allowance of raw water for New Kent County in the reservoir storage volume, should these localities ever choose to purchase the water from the City of Newport News and to construct the pipes, pump stations, treatment plants and distribution systems necessary to obtain the water. The water supplies and needs of the host localities have not been included in the RRWSG's calculations of the 39.8 mgd deficit for the region (see Map 3 - RRWSG Service Area and Host Communities).

On 27 October 2000, the City of Newport News reported a re-calculated 19 to 21 mgd safe yield benefit from the King William Reservoir based on the conditions contained in the Virginia Water Protection Permit. On 30 November 2000, the City of Newport News submitted an updated water needs assessment which reported that the Peninsula's 2050 deficit could be as low as 15 mgd or as high as 36 mgd, depending on the rate of regional population growth and economic development. The report indicated a 50 percent chance that the regional need for additional water supply in 2050 would be between 22 and 27 mgd.

Based on my review of the applicant's stated project purpose, I am defining the overall project purpose as follows: to satisfy the water supply needs of the localities in the Regional Raw Water Study Group service area through the year 2050.

3. Applicable Statutory Authorities and Administrative Determinations Conferring Corps of Engineers Regulatory Jurisdiction: Section 10 of the Rivers and Harbors Act of 3 March 1899 (30 Stat. 1151, 33 U.S.C. 403) and Section 404 of the Federal Water Pollution Control Act, as amended (Clean Water Act,) (Public Law 92-500, 86 Stat 816 and 33 U.S. C. 1344) are applicable.

4. Other Federal, State and Local Authorizations Obtained or Required and Pending:

a. Other Federal Authorizations: No other federal authorizations are required.

b. State Authorizations:

(1) Section 401 of the Clean Water Act (33 U. S. C. 1341): The issuance or waiver of a state certification assuring that the proposed discharge will not violate specified water quality standards is required prior to the issuance of the Corps of Engineers permit under Section 404 of the Act. In Virginia, the State Water Control Board (SWCB) and the Virginia Department of Environmental Quality-Water Division (DEQ) implement Section 401 under the 1989 Water Protection Permit law (Va. Code 62.1-44.15:5).

The Virginia DEQ issued its Virginia Water Protection Permit (VWPP)/401 Certificate Number 93-0902 on 22 December 1997 with an expiration date of 22 December 2007. The permit imposed a more restrictive minimum instream flow for the Mattaponi River than the one the RRWSG proposed, set a higher minimum downstream release from the dam into Cohoke Creek and placed maximum limits on interbasin transfers from the King William Reservoir to the other Newport News reservoirs, all of which the City of Newport News claimed restricted the safe yield of the project to the point that it would not provide enough water to justify its construction. The City of Newport News immediately filed suit in Newport News Circuit Court against DEQ and the State Water Control Board to have these restrictions removed. A ruling by the Newport News Circuit Court upheld the DEQ permit conditions and the City of

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Newport News did not appeal the decision, but stated that they would pursue changes to the permit when it is eligible for re-issuance in 10 years.

The Mattaponi Tribe also filed suit against the DEQ and the SWCB alleging that the Board issued its permit without considering the detrimental impact the project would have on the survival of the Tribe. In addition, King and Queen County and several environmental groups filed suit against the Board for issuing its permit. However, the court ruled that these groups lacked the legal standing to sue the Board on its decision.

(2) Virginia Wetlands Act (Va. Code 28.2-1300): Either the Virginia Marine Resources Commission (VMRC) or the local Wetlands Board must grant a permit for construction in any state-owned submerged land in the Commonwealth of Virginia or any tidal wetland area in “Tidewater Virginia” (generally east of Interstate 95). This includes the intake and associated structures, pipeline crossings and discharge structures. VMRC is reviewing the permit application. As the local governments are co-applicants, local wetlands board approval may not be required. The dam for the proposed reservoir is authorized by statute pursuant to Section 28.2-1203 of the Code of Virginia and would not require a permit from the VMRC.

(3) Virginia Dam Safety Act (Va. Code 10.1-604): The Virginia Soil and Water Conservation Board (under the Virginia Department of Conservation and Recreation) must issue construction permits to provide for design, construction, operation, and maintenance of impounding structures to protect public safety.

(4) Coastal Zone Management Act of 1972: The project must be constructed and operated in a manner which is consistent with the Virginia Coastal Resource Management Program. The City of Newport News has written to the Virginia Coastal Program Manager stating that the project is consistent with the Act. However, the state has requested more information in order to determine if they concur with the applicant’s draft federal consistency certification.

(5) Federal Safe Drinking Water Act: The Virginia Department of Health must approve the capacity of waterworks operation systems (Va. Code 32.1-172).

c. Local Authorizations:

(1) Virginia Erosion and Sediment Control Law (Va. Code 10.1-560): The law specifies minimum standards for control of soil erosion, sediment deposition, and non-agricultural runoff. Localities must adopt a plan that is consistent with the state program. The applicant is required to submit a sediment and erosion control plan for approval by the counties in which work is conducted.

(2) Chesapeake Bay Preservation Act (Va. Code 10.1-2100): Localities in eastern Virginia are required to implement land use controls to improve the condition of Chesapeake Bay waters and to designate Chesapeake Bay Preservation Areas in which all project activities would be required to comply with the appropriate land use controls. The Act is administered by the Chesapeake Bay Local Assistance Department. The 1997 King William County Comprehensive Plan shows the proposed reservoir and designates a 100-foot wide area around the reservoir pool area as a Resource Protection Area. The remainder of the County is designated as a Resource Management Area. Specific authorizations for the reservoir have not yet been sought.

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(3) Local Zoning: The reservoir site is currently zoned as Agricultural/Conservation. Approvals from King William and New Kent Counties under state and local consent statutes and local zoning ordinances would be required for some components of the project. The counties have provided local consent for the project.

5. Public Notices, Public Hearing and Publication of Environmental Impact Statement (EIS):

a. Notice of Intent to Prepare Draft EIS: Because of the range of alternatives and the potential for significant environmental impacts, the District determined that an Environmental Impact Statement would be required. A notice of intent to prepare a Draft EIS on the City's proposed raw water supply was published in the Federal Register on 30 July 1990.

b. Scope of Study for Draft EIS: A public scoping meeting was not conducted because the project alternatives were so geographically widespread. Rather, a Public Notice was issued on 1 August 1990 requesting public comments by 20 August 1990 on the Scope of Study for the development of an EIS on the regional water supply to meet the future short and long-term needs of the Regional Raw Water Study Group. The notice listed a reservoir on Cohoke Creek with a pumpover from the Mattaponi River as one of numerous alternatives that would be considered and indicated that an Environmental Impact Statement would be required to evaluate the environmental impacts, project alternatives and other public interest review factors

c. Draft EIS and Public Notice: In accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969, as amended, a Draft Environmental Impact Statement for the proposed water supply project was released for public review and comment on 4 February 1994 with a 45-day comment period to end on 21 March 1994.

d. Public Hearing: In the District's Public Notice announcing the availability of the Draft EIS, it was also announced that a public hearing for this proposal had been scheduled for 7:30 PM on 8 March 1994 in the auditorium of the Acquinton Elementary School which is located near the intersection of Routes 30 and 629 in King William County, Virginia. The hearing record remained open for ten days after the public hearing for the submittal of written comments. The District determined that a 30-day extension of the Draft EIS comment period until 20 April 1994 was warranted to allow for thorough public review of the document.

e. Public Notice: Based on comments received at the District's Public Hearing and in response to the Draft EIS, the District announced in a Public Notice dated 8 June 1994 the intent to prepare a Supplement to the Draft EIS to remedy the inadequacies of the document, address concerns raised during the public review and include the results of additional field studies.

f. Supplement to the Draft EIS and Public Notice: The Norfolk District announced the availability of the Supplement to the Draft Environmental Impact Statement (Supplement) for the project on 29 December 1995 with a 45-day comment period to end on 12 February 1996. However, official Notice of Availability of the document was not announced in the 29 December 1995 Federal Register due to the partial federal furlough from 18 December 1995 to 12 January 1996. The Notice of Availability appeared in the 26 January 1996 Federal Register with the original closing of the comment period on 12 February 1996. Although the Supplement was mailed on time, the District determined that a 30-day

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extension of the comment period until 13 March 1996 was warranted to allow for thorough agency and public review of the document.

g. Final EIS and Joint Federal/State Public Notice: The Norfolk District announced availability of the Final Environmental Impact Statement (Final EIS or FEIS) for the project on 24 January 1997 with a 30-day comment period to end on 24 February 1997. The Public Notice also announced the receipt of the RRWSG's permit application. In a Public Notice dated 3 February 1997, the comment period was extended by 30 days to end on 26 March 1997. In a subsequent Public Notice dated 11 March 1997, the comment period was further extended by 60 days to end on 26 May 1997. Finally, in a Public Notice dated 9 May 1997, the comment period was extended an additional 60 days to end on 25 July 1997. The comment period for the Final EIS totaled 180 consecutive days.

Copies of all EIS documents were made available for viewing during normal business hours at the Army Corps of Engineers Norfolk District Office; the Offices of the City Managers in the Cities of Hampton, Newport News, Poquoson, and Williamsburg; the Offices of the County Administrators in the Counties of James City, King and Queen, King William, New Kent, and York; as well as at the following libraries: Hampton Public Library, Heritage Library, King and Queen Branch Library, Newport News Public Library, Pamunkey Regional Library, Poquoson Public Library, Williamsburg Regional Library, and York County Public Library. Single copies of the EIS documents were made available upon request and at no charge for as long as they lasted. Individuals who subsequently requested copies were referred to the local libraries.

6. Project History: In June of 1989, the City of Newport News invited the District to attend a briefing on the City's future water supply plans to be held on 13 July 1989. (According to a chronology of events prepared by the RRWSG, organizational meetings were held as early as 18 March 1987. However, the District was not involved until June of 1989.) The City of Newport News then presented their plan at the District's regularly scheduled federal/state interagency meeting later that same day. The initial interagency coordination meetings were held on 17 April and 8 May 1990. A notice of intent to prepare a Draft EIS on the City's proposed raw water supply was published in the Federal Register on 30 July 1990 and a Public Notice was issued on 1 August 1990 requesting public comments on the Scope of Study. The District's scoping outline and copies of letters received in response to the Public Notice were sent to the City of Newport News on 17 December 1990 as a guide for the preparation of their environmental report.

On 13 November 1990, the City of Newport News executed a specific agreement with the King William County Board of Supervisors for the King William Reservoir and Mattaponi River pumpover entitled "King William Reservoir Project Development Agreement." According to a chronology of events prepared by the City of Newport News, an earlier "Memorandum of Understanding" between Newport News and King William County for cooperative investigation of the King William Reservoir was in place on 23 May 1989. To the District staff's knowledge, no similar agreements were ever executed for the development of any other alternative. The District staff learned of the existence of this host agreement in late 1993 or early 1994, but was unaware that it had been executed before the EIS process began. The District only learned of the date of the agreement in January 1998, when a copy was provided by an opponent of the proposal who had obtained it from Newport News through the Freedom of Information Act. Up until seeing the agreement, the District and the federal agencies believed that the RRWSG had taken no steps to identify a preferred alternative before initiation of the EIS process.

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James City County withdrew from the Regional Raw Water Study Group in March 1993 after the City of Newport News formally endorsed selection of the King William Reservoir as the Group's preferred alternative. James City County did not agree with this selection, as they believed the Ware Creek Reservoir alternative should be the Group's preferred alternative. It should be noted that the RRWSG's projected raw water deficit did not decrease upon James City County's withdrawal from the group. (The Ware Creek Reservoir project, originally proposed in 1984 by James City County, involved the creation of a 1,238-acre impoundment on a tidal freshwater tributary to the York River to provide 7 mgd of treated water. EPA vetoed the project in 1989 under Section 404(c) based on unacceptable adverse effects on the aquatic environment including the destruction of 425 acres of high quality wetlands. EPA viewed the project as environmentally costly and contributing to an unacceptable trend of wetland loss and reduction in freshwater flow to the Chesapeake Bay watershed. A reservoir at Ware Creek, with a pumpover from the Pamunkey River, was one of the alternatives considered by the RRWSG.)

On 6 July 1993, an environmental report and a permit application (which was found to be incomplete) were received from the City of Newport News. The Draft EIS published in February 1994 addressed 31 alternatives and carried forward 3 of these for detailed review: 1) a reservoir on Ware Creek between James City and New Kent Counties with pump-over from the Pamunkey River, 2) a reservoir on Black Creek in New Kent County with pump-over from the Pamunkey River, and 3) a reservoir on Cohoke Creek in King William County with pump-over from the Mattaponi River, which is the applicant's preferred alternative. As described in the DEIS, the originally proposed King William Reservoir (KWR-I) would have impounded a surface area of approximately 2,234 acres providing a storage volume of approximately 21.7 billion gallons with a safe yield of 25.5 mgd. The reservoir project was one component of what was at that time described as a 30.2 mgd regional raw water supply plan which included use restrictions and groundwater development. (In the Final EIS, the RRWSG recalculated the projected deficit, increasing it from 30.2 mgd to 39.8 mgd).

When the original dam location was first presented to the District and the federal advisory agencies, the RRWSG reported that 293 acres of wetlands would be impacted (based on National Wetland Inventory mapping). By the time the Draft EIS was published, the applicant's environmental consultants had performed a more thorough review (based on aerial photo interpretation) and reported that 479 acres would be impacted. However in May 1994, a detailed wetland delineation of the King William site conducted jointly by environmental consultants working for Newport News Waterworks and James City County revealed that the reservoir would impact approximately 653 acres of non-tidal wetlands (based on field verification). The City of Newport News was advised by District staff on several occasions that such a large and unprecedented impact to high quality wetlands raised serious concerns.

In their 17 May 1994 and 1 June 1994 letters commenting on the Draft EIS, both the U. S. Fish and Wildlife Service and EPA commented that the DEIS was inadequate because it did not contain sufficient information to fully assess the environmental impacts and requested that the District prepare a Supplement to the DEIS. The Service also stated that the project may result in substantial and unacceptable impacts to Aquatic Resources of National Importance (ARNI). The District announced in a Public Notice dated 8 June 1994 that a Supplement to the Draft EIS was warranted to remedy the inadequacies of the document, address concerns raised during the public review and include the results of additional field studies, including the revised information on wetland impacts.

Of the three reservoir alternatives described in the Draft EIS, the Black Creek Reservoir in New Kent County was reported to impact the least wetland acreage (285 acres) and it appeared to the District and

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the federal agencies that it could be determined to be the least environmentally damaging of the reservoir alternatives. New Kent County indicated in their letter commenting on the Draft EIS that they were “not adverse to the construction of a regional reservoir at Black Creek” and would support the project “if a sufficient amount of that new supply were reserved for the use of New Kent County.” The City of Newport News stated that a reservoir at Black Creek would not have enough storage area to satisfy both their projected deficit and New Kent County's desired host allowance. They further claimed that another reservoir and its associated wetland impacts would be required to make up that difference if the Black Creek Reservoir was determined by the District to be the environmentally preferred alternative. Based on this, Newport News requested that the District eliminate the Black Creek alternative from further consideration. The District did not concur because other non-reservoir alternatives could potentially meet the small shortfall in safe yield. In the District's letter dated 1 August 1994 outlining the informational needs for the Supplement to the Draft EIS, the City was subsequently given written notification that the King William Reservoir alternative could be determined to be environmentally unacceptable when other less environmentally damaging reservoir alternatives were available (including a smaller King William Reservoir).

Although New Kent County had been a willing participant up to that time, in September 1994, R. J. Emerson, Jr., the Acting County Administrator, announced that the County would no longer cooperate with the City of Newport News toward further analysis of a reservoir in Black Creek. On 27 October 1994, the City of Newport News sent a letter to the District outlining their detailed legal position for not providing any further analysis of the Black Creek Reservoir alternative and announced their intention to eliminate it from further evaluation in the information package they would supply for the Supplement to the Draft EIS. In a letter dated 21 November 1994, the District informed the City that unavailability of an alternative is not sufficient reason to eliminate it from further review under NEPA. Therefore, the District proceeded with the best available information on the Black Creek Reservoir alternative and it was carried forward as a “No Action” alternative (in accordance with 33 CFR 325 Appendix B, 9b(5)(a)) and compared in similar detail to the RRWSG's preferred alternative throughout the December 1995 Supplement to the Draft EIS.

Despite New Kent County's resolve not to cooperate with the City of Newport News, County representatives had written to EPA Region III on 17 June 1994 requesting a meeting to discuss the feasibility of developing a reservoir at Black Creek for their own uses. However, the meeting was never held. It is unclear whether the County opposes the development of a reservoir at the site; therefore, the Black Creek Reservoir alternative might once again become available to the City of Newport News. On 29 March 1996, the District wrote to New Kent County to learn if Black Creek was still unavailable to the City. The New Kent County Board of Supervisors indicated in a letter dated 23 April 1996 that the County remained committed to not cooperating with Newport News. They did not, however, withdraw their host agreement with the City to allow the construction of the pipeline from the proposed King William Reservoir across their jurisdiction.

The City of Newport News' host agreement with King William County stipulated that the reservoir would provide 47% dead storage for recreational purposes. This means that almost half of the water in the reservoir would not be available as water supply and Newport News would need to rely heavily on augmentation by river pump-over in order to meet the projected safe yield. Recreational potential already exists on most reservoirs without added dead storage, and the applicant's stated purpose of the reservoir is to provide a source of water, not year-round recreation. Therefore, in a 1 August 1994 letter, the District recommended that the King William Reservoir proposal be evaluated without the proposed 47% dead

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storage in order to reduce the project's reliance on the Mattaponi River. Both the Black Creek and the Ware Creek Reservoir proposals included 25% dead storage as a default value. The District also recommended that a discussion of a smaller King William reservoir that would reduce the 653-acre wetland loss be included in the Supplement to the Draft EIS.

The City of Newport News did not wish to reduce the size of the reservoir and asserted that a large reservoir would be environmentally superior since it would have the potential to meet some of the additional regional needs without constructing additional reservoirs. Therefore, in a letter dated 30 November 1994, the RRWSG proposed for agency consideration an enhanced King William Reservoir project with the same physical dimensions as KWR-I, but with an additional 45 to 120 mgd pumpover from the Pamunkey River to augment the 75 mgd Mattaponi River withdrawal. The enhanced project would supply between 6 to 15 mgd of additional treated safe yield benefit for other jurisdictions. The City of Newport News was advised that if they chose to pursue such a plan, the potential users must be identified, the additional need must be demonstrated and the alternatives to meeting the need within those jurisdictions must be investigated.

The City of Newport News had begun discussions with James City County, New Kent County and Hanover County, and had plans to contact Gloucester County concerning their participation in an enhanced King William project. Also, the District staff learned that James City County and New Kent County might be interested in obtaining water from Hanover County's proposed 25 mgd side-hill reservoir project (this permit application is currently inactive.) The District staff recognized the potential to satisfy the needs of these localities as well as the potential for conflicting competition for the Pamunkey River as a water source. Therefore, the District staff arranged an interagency meeting for 19 December 1994 to learn each jurisdiction's short and long term water needs, their planning period and what alternatives they had already explored to meet those needs. However, in a letter dated 29 November 1994, Newport News stated strong objection to this action until they had "established clear parameters" on how these others might become partners with the RRWSG and expressed their fear that the District's involvement might disrupt the development of local institutional arrangements. Although the District did not concede to Newport News' proposed "ground rules" for the meeting, Newport News did attend and there were open discussions of the needs of these jurisdictions. None of the localities made any commitments for participation on regional cooperation for an enhanced project.

After considering this option for over a year, the RRWSG decided not to pursue the second pumpover at that time and on 14 June 1995, the City of Newport News submitted their information for the Supplement to the DEIS along with a revised permit application relocating the dam 2,900 feet upstream of the originally proposed dam location. In order to maintain the proposed reservoir storage volume, the pool elevation was raised from 90 to 96 feet to impound a surface area of approximately 2,222 acres with a storage volume of 21.2 billion gallons. Ninety-four acres of wetland impacts were avoided by moving the dam upstream; however, raising the pool elevation by 6 feet would inundate an estimated additional 15 acres of wetlands for a net reduction of 79 acres. The total wetland impacts were reduced to 574 acres at the revised dam location (KWR-II) and direct impacts to a bald eagle nest were avoided.

Although the City of Newport News stated that they had no plans to pursue the second pumpover, and the impacts of such a proposal were not evaluated in the EIS, they clearly did not abandon the potential for such an option. In the 8 August 1995 Addendum Number 2 to the King William Reservoir Project Development Agreement between the City of Newport News and King William County, a Pamunkey

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River pump station is included to provide a second pumpover to the proposed King William Reservoir as a way to enhance the safe yield of the reservoir and to supply water to jurisdictions other than those composing the group as of March 1995. Furthermore, in a 27 February 1996 Memorandum of Understanding, the City of Newport News has promised to provide an additional 4 mgd of water to James City County from an enhanced King William Reservoir.

In a letter dated 13 May 1996, the District recommended that the RRWSG recalculate water supply deficits for the region using the Virginia Employment Commission's revised population projections and by addressing the Virginia Department of Environmental Quality's comments on ways to reduce the estimated demand by up to 10.3 mgd. Also, the RRWSG did not calculate potential gains in water conservation from the Federal Energy Policy Act's efficiency requirements for low-flow plumbing fixtures manufactured after January, 1994. Instead, these potential water savings were dismissed as being "uncertain." Therefore, the District recommended that the RRWSG incorporate more aggressive and proactive water savings measures into their conservation plan. In light of the potential for reduced demand projections and more aggressive conservation, and the still significant wetland loss, the District informed the RRWSG that the feasibility of a downsized reservoir with a much more substantial reduction in the wetland loss should be addressed in the Final EIS. In their letter of 13 November 1996, EPA rated both the Draft EIS and Supplement to the Draft EIS as EU-2, which means that they found the magnitude of impacts associated with the project to be Environmentally Unsatisfactory and the documents did not contain sufficient information for EPA to fully assess the environmental impacts that should be avoided in order to protect the environment.

The City of Newport News maintained that a dam at the second location (KWR-II) would be technically superior from a long-term regional public water supply perspective. However, in view of the concerns of the District and other federal and state agencies over the loss of wetlands and wildlife habitat, the RRWSG elected to submit a second revised permit application on 30 December 1996 for a dam at a location 9,700 feet (1.7 miles) upstream of the originally proposed dam location, thus reducing the impacts to 437 acres of wetland/open water habitat (KWR-IV). Information submitted by the RRWSG for the Final EIS also included an additional dam location (KWR-III) that was never proposed to the District and the advisory agencies for consideration. The KWR-III location would be 7,500 feet upstream of KWR-I and would impact an estimated 511 acres of wetlands. In order to enhance the safe yield benefit of the KWR-IV reservoir, and minimize drawdown, the applicant retained their originally proposed 40/20 Tennant Minimum Instream Flow which allows for more frequent river withdrawals.

The City of Newport News claims that the 9 billion gallon reduction in storage capacity of the KWR-IV alignment makes the project only marginally adequate to meet the reasonably foreseeable water needs of the Lower Peninsula. Therefore, the City has made plans for future enlargement of the reservoir footprint back to either the KWR-I or KWR-II location. The City of Newport News asserts that if the dam was sited at the KWR-I or KWR-II location, the reservoir could supply between 2.2 and 3.9 mgd of additional treated water. In the 11 March 1997 Addendum Number 3 to the King William Reservoir Project Development Agreement between the City of Newport News and King William County, it is stated that the lands between the KWR-II and KWR-IV dam sites would be reserved for possible future downstream reservoir enlargement. The 186 acres of wetlands and 620 acres of uplands between the Cohoke Millpond and the KWR-IV dam site have been offered as part of the applicant's mitigation package as a wildlife preservation area; however, the mitigation plan states that the land may not be preserved in perpetuity. Therefore, this entire area may eventually be impacted as well by future reservoir expansion,

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if permitted by all regulatory agencies. The Final EIS was published on 24 January 1997 based on the applicant's revised application and information contained in their environmental report.

In their letter of 25 July 1997, commenting on the Final EIS, EPA did not change its "Environmentally Unsatisfactory" rating as they believed the loss of 437 acres of diverse and valuable wetlands/open water habitat within the Cohoke Creek basin would be significant. EPA re-stated that the wetlands at the project site qualify as an Aquatic Resource of National Importance (ARNI) due to their "diverse type, quantity and functional capacity." Because major outstanding environmental and cultural issues remained and the Final EIS still contained some vague data and unsupported conclusions, EPA recommended the preparation of a Supplement to the Final EIS. Also, in their 25 July 1997 letter commenting on the Final EIS, the U.S. Fish and Wildlife Service recommended denial of the King William Reservoir due to the project's impacts on wetlands, perennial and intermittent streams, upland wildlife habitat, alteration of downstream wetlands, elevation of salinity levels in the York River basin and impacts to the federally listed threatened sensitive joint-vetch (*Aeschynomene virginica*). The Service reaffirmed their 13 June 1994 position that these impacts would be extremely detrimental to the fish and wildlife resources of Southeast Virginia and will result in substantial and unacceptable impacts to an ARNI.

Three substantive critiques of the applicant's needs assessment were received from the public in response to the Final EIS. In March 1998, the District requested that the Corps' Institute for Water Resources (IWR) provide an independent technical review of the applicant's water needs forecast and the three critiques. IWR contracted with Planning and Management Consultants, Ltd. (PMCL) to perform an independent, third-party review of the documents. In a May 1998 report, PMCL concluded that the RRWSG's projected water supply deficit of 39.8 mgd might actually be in the range of 16 to 19 mgd. The City of Newport News did not accept PMCL's findings and on 31 July 1998, provided a point-by-point rebuttal in which they questioned the objectivity of PMCL's review. In October 1998, the District requested IWR's review of the PMCL report and the City of Newport News' rebuttal to determine which was correct. IWR assembled a panel of four nationally and internationally recognized water resource experts to perform the review and presented the draft report of their findings to me during a 4 May 1999 briefing. The consensus of the panel was that Newport News Waterworks had significantly overestimated future demand and that the stated need was not supported by their data. Using the City of Newport News' numbers, the panel calculated a deficit of about 17 mgd by 2040 and concluded that the City of Newport News was not at risk if it did not immediately increase its water supply (see Section 7, Extent of Public and Private Need, for a full discussion).

Based on the lack of a demonstrated need to destroy 403 acres of vegetated wetlands, 34 acres of shallow open water and 21 miles of perennial and intermittent streams as well as the combined adverse environmental impacts of the project, I reached a preliminary position that the issuance of a permit for the project would be contrary to the public interest. My staff and I briefed the North Atlantic Division Commander and the HQUSACE staff of my preliminary position to deny the permit on 27 May 1999. The then Assistant Secretary of the Army for Civil Works (Dr. Joseph Westphal) was briefed on 28 May 1999. Dr. Westphal requested that I not inform Newport News of this preliminary position until he had informed the Governor of Virginia, U. S. Senators and interested Congressmen of the District's preliminary position.

On 3 June 1999, the late Congressman Herbert Bateman informed the City of Newport News of the District's preliminary position. I met with the City of Newport News and Congressman Bateman on 4 June 1999 to explain the rationale for my preliminary position and to deliver my letter of 4 June 1999 to

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the applicant. My letter of 4 June 1999 outlined the reasons for my preliminary position. In a letter dated 9 June 1999, the City of Newport News requested an additional 30 days to provide a rebuttal. On 14 June 1999, I granted a 30-day extension to the two-week response period. On 16 July 1999, the City of Newport News submitted their 132 page report entitled "Lower Peninsula Water Needs: A Summary Response and Rebuttal to Institute for Water Resources 'Special Study', May 1999" dated July 1999. In this report, the City of Newport News questioned the objectivity of one of the panel members, Dr. John Boland, and alleged that all panel members did not concur with the findings of the IWR report.

In a letter dated 8 June 1999, Virginia Governor James S. Gilmore, III informed me that he did not agree with my preliminary position of denial and urged me to determine that the King William Reservoir is the least environmentally damaging practicable alternative in the District's formal Record of Decision. As my preliminary position is contrary to the written position of the Governor of the state in which the work would be performed, the application must be referred to the North Atlantic Division Commander for resolution in accordance with the provisions contained in 33 CFR Part 325.8 (b)(2).

During a meeting on 19 July 1999, the City of Newport News and their water resources experts briefed me on their rebuttal to the IWR needs study. On 24 August 1999, the City of Newport News submitted a report entitled "Comparison of King William Reservoir Project with Recently Permitted Reservoirs in the Southeastern United States" dated, August 1999. On 24 September 1999, the City of Newport News submitted a report entitled "Alternatives Summary Report" dated October 1999. Subsequently, I requested that the IWR panel review all of the applicant's previous and recent submittals on water need (as well as those from the public) before meeting with the applicant and finalizing their report.

On 17 December 1999, a meeting between the IWR panel, various Corps of Engineers representatives and the City of Newport News was held at the IWR office in Alexandria, Virginia. Also in attendance were representatives from the Virginia Department of Health, Department of Environmental Quality, Department of Natural Resources, and Department of Commerce and Trade as well as aides from the offices of Congressman Bateman, Congressman Scott and Senator Robb. The purpose of the meeting was to provide an opportunity for the City to discuss the findings of the IWR report with the panel. At this meeting, the panel agreed to provide a list of measures to improve the major deficiencies in the RRWSG's analysis if they chose to provide further information in support of their deficit projections. In a letter dated 21 December 1999, Newport News Mayor Joe Frank outlined his understanding of what occurred at the meeting and requested that the District provide the list. On 22 December 1999, I provided an interim response to the Mayor's letter indicating that a detailed response would follow after the first of the year.

I reviewed all of the information submitted by the applicant in support of the proposed reservoir and found nothing that would lead me to change my preliminary position of denial. Therefore, in a letter dated 3 February 2000, I provided a detailed response to the Mayor's letter which confirmed my intention to recommend denial of the permit to the North Atlantic Division Commander. I reminded the City that this position was not based solely on the issue of need and that my preliminary recommendation of denial was based on the combined adverse environmental, cultural and socioeconomic impacts even if the City's entire projected need could be demonstrated through a new assessment. In this letter, I also provided the IWR list of major deficiencies, and outlined the options available to Newport News to bring the process to closure. In addition, I informed the Mayor that a collaborative effort between the City of Newport News, the District and the state to solve the RRWSG's water needs would not be possible until the conclusion of the permitting process.

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In a letter dated 22 February 2000, Mayor Frank expressed his grave concern for the physical, cultural and economic health and well-being of the over 600,000 water customers that depend on the City to provide them an adequate and affordable water supply. He also stated his belief that the cultural and environmental impacts of the King William Reservoir project have been overstated and those that will occur can be effectively mitigated. Mayor Frank stated that the City did not intend to abandon the King William Reservoir project by withdrawing their permit application. However, he requested until 31 March 2000 to inform the District whether the City would submit additional information on the need projections and on the perceived impacts to Native Americans. The District granted the requested extension.

On 30 March 2000, Newport News City Manager, Mr. Ed Maroney, requested an additional 7-month extension (until 1 November 2000) for the City to prepare and submit their new water needs assessment in support of the King William Reservoir project. In a letter dated 6 April 2000, I granted the requested extension and again cautioned the City that before they went to the additional expense of providing more information on water need, they should be reminded that I still intended to recommend denial of the project on the basis of combined adverse environmental, cultural and socioeconomic impacts. Because of this extension, the Norfolk District's recommendation to the North Atlantic Division on the application was postponed until the new information could be reviewed and considered in the recommended Record of Decision.

Newport News staff originally indicated that they did not need the final version of the IWR report for the preparation of their new water need information that would be submitted on 1 November 2000. However, in mid-August 2000, Newport News staff indicated that the final IWR report was indeed critical to the preparation of the new needs assessment. Accordingly, the IWR staff was requested to complete the final report as quickly as possible. The final IWR report was submitted to the Norfolk District on 12 October 2000. The panel's final conclusions on water need remained basically unchanged from those in the draft report and their analysis demonstrated that there is no imminent need to expand the City's water supply. The panel found that the RRWSG's data and assumptions implied a very small risk of shortage by 2020 and subsequent information suggests that the risk is likely even lower.

In a letter dated 21 April 2000, the Commander of the North Atlantic Division provided instructions to the Norfolk District outlining the procedures to be followed for completing the review and forwarding my recommendation on the permit application to the Division. On 3 May 2000, these procedures were announced in a Public Notice, which both appeared on the Norfolk District Regulatory Branch's Public Notice Web Page and was mailed to all parties on the District's mailing list for the project. The procedures are as follows:

The District's recommended Record of Decision will be published for a 45-day public comment period. In light of the numerous opportunities for public comment that the District has previously provided, Division did not require additional public hearings or meetings. All written comments received during this period will be analyzed and forwarded along with the final recommended Record of Decision to the North Atlantic Division. The North Atlantic Division Commander will provide a copy of the District's final recommended Record of Decision to those parties who submitted comments during the 45-day comment period. These parties will be afforded an additional 30 days in which to submit written comments to the Division. According to the 21 April 2000 letter, the Division Commander will consider only timely, written comments relevant to the final recommended Record of Decision (late comments, oral comments and comments related to new or additional information not previously submitted to the

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Norfolk District will not be considered.) At the end of the 30 days, the Division Commander will conduct a review of the record and the Division Commander will issue a decision. The North Atlantic Division will not seek or entertain any additions to the record unless, in the course of the review, the administrative record is found to be deficient in some respect. If any deficiency is identified, the Division will open and supplement the record only to clarify the point in question. Publication of the District's recommended Record of Decision for public review and comment should address the recommendation from EPA and others for the publication of a Supplement to the Final EIS.

At the City's request, the North Atlantic Division arranged a facilitated meeting between the City of Newport News and the Norfolk District on 17 July 2000. The District staff believed that the purpose of the meeting was to discuss the findings of the City's new needs assessment. However, the City had apparently informed Division staff that they did not understand the rationale behind my preliminary position of denial and wished to discuss my letter of 4 June 1999 in detail. My staff and I had participated in numerous meetings with the City since my preliminary position letter and had already discussed all issues the City raised. At the facilitated meeting, District staff informed the City of Newport News that my recommended Record of Decision was nearing completion and would contain a detailed discussion on each issue. Furthermore, not all of the new information submitted to the District had been fully reviewed and incorporated into the document. District staff reminded the City that two separate opportunities for comment on my recommended Record of Decision would be provided before the Division's decision would be made. The District staff indicated that if the City still had questions after reading the recommended Record of Decision, the appropriate time to conduct further discussions would be during the comment period.

In a series of letters dated 20 July, 24 August, 26 August, 12 September, 25 September, 26 September, 2 October, 4 October, 5 October, 17 October, and 7 November 2000, the City of Newport News and their attorneys submitted requests under and concerning the Freedom of Information Act (FOIA) to view and copy the District's permit application file. Responses were provided to these requests and the City was provided copies of all requested documents that were determined by District Office of Counsel to be releasable at that time.

On 20 October 2000, the District granted the City's request for an additional one-month extension (to 1 December 2000) to provide additional information on their application. On 30 November 2000, the City submitted their revised water needs assessment along with further comments on several other issues. All information submitted by the applicant, state and federal agencies and the general public has been reviewed and fully considered in the preparation of the District's recommended Record of Decision on this project.

7. Extent of Public and Private Need: In the Final EIS, the City of Newport News predicted that by 2040, the lower Peninsula would have a shortage of 30 mgd if nothing is done to expand existing supplies. The Norfolk District is aware that the Lower Peninsula will need additional public water supply as the population in the region grows. However, the question is whether the assumptions the City of Newport News has applied in their calculations of future demand are appropriate. The District relies on the applicant to submit accurate information in support of a permit application. Despite the expected increases in residential and economic development during the 1990's, growth in water demand has not increased at the same rate as in the 1980's as predicted by the City of Newport News. In fact, Newport News Waterworks data demonstrates that actual water demand has remained almost the same from 1990 to 2000. The applicant claimed that 25 percent of future demand would be met through conservation and

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by imposing stringent water-use restrictions in times of severe drought. The Virginia Department of Water Quality commented that the RRWSG was planning for the largest project possible and that with all of the safeguards that are incorporated into the plan as proposed, the likelihood that water use restrictions would ever be imposed is very slight.

The federal advisory agency representatives and my staff recognized the need for more information to support the applicant's demand projections and requested additional information to be included in both the Supplement to the Draft EIS and the Final EIS. Therefore, in a letter dated 1 August 1994, the District requested that a discussion of how conservation measures would be implemented in each locality and a more comprehensive explanation of the RRWSG's drought planning be included in the Supplement (including indicators used to assess drought conditions and the means by which use restrictions will be enacted and enforced). The District requested that the applicant also address the potential downsizing of military facilities in the region and associated employment reductions at military suppliers such as Newport News Shipbuilding in the calculation of future water supply demand. The District requested that the RRWSG fully consider and address in the Supplement a recommendation for a non-structural approach to meet the region's needs contained in a 1990 University of Virginia Urban and Environmental Planning report submitted by the Southern Environmental Law Center in response to the DEIS entitled "Demand Management and Raw Water Supply Alternatives for the Lower York-James Peninsula 1990-2030."

The District staff learned that the Virginia Employment Commission's 1993 revised population projections were lower than those used by the RRWSG; therefore, the District requested in a letter dated 13 May 1996 that the water supply deficits for the region be recalculated for the Final EIS. The District and the federal advisory agencies believed that the RRWSG had underestimated the potential for water conservation and had inaccurately characterized the Lower Peninsula's consumption rates by comparing them to those of cities in dry western states where outdoor water use is considerably higher. The RRWSG was also advised that as they had not provided the more comprehensive discussion of their drought planning or included a discussion of how conservation measures would be implemented in each locality as requested for the Supplement, these should be provided for publication in the Final EIS. It was also recommended that the Final EIS address the Virginia Department of Environmental Quality's comments on methods to reduce the projected demand by up to 10.3 mgd. The District also recommended that the RRWSG's conservation plan address more aggressive water savings measures such as a region-wide incentive program for retrofitting of high water use fixtures in older homes, incentives for industries (both existing and new) to implement non-potable water reuse systems and reduction in outdoor uses at times other than during emergency restrictions.

It was further recommended that consideration of growth limitations due to building restrictions imposed by the Chesapeake Bay Act be taken into account when projecting 2040 populations and total build-out. An evaluation of the effects of military downsizing on employment at the Langley Research Center and the Newport News Shipyard and verification that the Army will not maintain the Big Bethel Reservoir for water supply were also requested for the Final EIS. In light of the potential for considerably reduced demand projections and more aggressive conservation, the District informed the RRWSG that the feasibility of a downsized reservoir with a much more substantial reduction in the wetland loss than that shown in the Supplement should be explored in the Final EIS.

Three substantive critiques of the applicant's needs assessment were received in response to the Final EIS: (1) a critique dated 14 July 1997 prepared by Michael Siegel and Dr. Thomas Muller on behalf of

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the Alliance to Save the Mattaponi and the Sierra Club entitled "Analysis of the Lower Virginia Peninsula, Regional Raw Water Supply Plan, Environmental Impact Statement, January 1997", (2) a critique dated 23 July 1997 prepared by Scott Chaplin for the Rocky Mountain Institute entitled "Comments Regarding the Final Environmental Impact Statement (FEIS) for the Lower Virginia Peninsula Regional Water Supply Plan 1990-2040", and (3) an undated critique prepared by Dr. Donald H. Phillips, President of the West Point Hunt Club, Inc. entitled "Comments on the Final Environmental Impact Statement for the Regional Raw Water Study Group's Lower Virginia Peninsula Raw Water Study Plan." All of these critiques alleged that the applicant's projected water need was greatly overstated.

a. First IWR Review: The Corps of Engineers' Institute for Water Resources (IWR) was requested in the Norfolk District's Scope of Work, dated March 1998 to provide an independent technical review of the applicant's water needs forecast and the three critiques. IWR contracted with Planning and Management Consultants, Ltd. (PMCL) to perform an independent, third-party review of the documents. PMCL submitted an interim report on 6 April 1998 and a draft final Report (Task B) on 23 April 1998. Their final report entitled "Review of Water Supply Needs Assessment for the Regional Raw Water Study Group, Newport News, Virginia." was submitted in May 1998. The PMCL report and the public critiques pointed to possible flaws in the data used to estimate need and questioned the validity of the methodology used by Newport News Waterworks to calculate the projected need for the RRWSG through the year 2040. According to PMCL's evaluation, numerous inadequacies in the analytical methods used by RRWSG tended to overestimate future demand as well as underestimate future supply. PMCL concluded that the projections of population served and employment were optimistic relative to the national projections and that residential conservation was underestimated. PMCL also found a lack of justification for excluding the supply capacity of the Big Bethel reservoir in the RRWSG's future supply.

Therefore, PMCL concluded that the RRWSG's projected water supply deficit of 39.8 mgd might actually be in the range of 16 to 19 mgd. The City of Newport News commented in a letter dated 22 May 1998 that they had found the report to be seriously flawed and biased. The Norfolk District arranged a meeting between the City, IWR, and PMCL on 8 July 1998 so that the City could present their views and discuss the report with the reviewers. In a letter dated 31 July 1998, the City provided a point-by-point rebuttal of PMCL's findings and questioned the objectivity of PMCL. Additional comments were also submitted by Michael Siegel, Dr. Thomas Muller, and Dr. Donald Phillips on both the PMCL report and the Newport News Waterworks rebuttal.

b. Second IWR Review: In a second Scope of Work dated October 1998, the Norfolk District requested IWR to review the differences between the PMCL report and the City of Newport News rebuttal, as well as the additional public comments, and as the Corps' experts in water use forecasting and conservation, provide their independent expert opinion on the most reasonable position for each contended issue. During the IWR review period, both Newport News Waterworks and some of the authors of the critiques met with IWR staff to discuss their findings and submitted further written comments for IWR's consideration. The City of Newport News also submitted a report in support of their projections prepared by Research and Planning Consultants, January 1999 entitled "Review of Planning Assumptions for Water Needs Assessment Lower Virginia Peninsula."

IWR assembled a panel of four nationally and internationally recognized water resource planning experts to conduct the review. William J. Werick, the panel member from IWR was joined by John J. Boland, a Johns Hopkins University professor; Jerome Gilbert, a former President of the American Water Works Association and former manager of the East Bay Mud Utility; and Roland C. Steiner of the Interstate

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Commission on the Potomac River Basin. IWR met with the City of Newport News on 14 December 1998 and with the principal critics of the City's study on 15 December 1998 to ensure that both sides had an equal opportunity to explain their case. IWR then developed and distributed to all involved parties a list of key questions to be answered. An EXCEL spreadsheet was developed to estimate how uncertainty in each component of the forecast affected the forecasted amounts of water use. IWR presented the draft report of their findings to me and my staff during a 4 May 1999 briefing.

The panel did not prepare an alternative forecast, rather they prepared an alternative calculation of the RRWSG's need using the same forecasting approach as Newport News and most of the same data, but replaced certain assumptions they deemed questionable with more plausible numbers. The panel's interpretation of the data arrived at a significantly different deficit than that projected by Newport News Waterworks. The consensus of the panel is that Newport News Waterworks has significantly overestimated future demand and that the stated need is not supported by their data. The City of Newport News based their population projections on optimistic local government estimates which are much higher than the projections of the U. S. Census Bureau and the Bureau of Economic Analysis. Likewise, the City of Newport News' estimate of future employment growth is higher than the federal government projections. The panel concluded that the RRWSG's per capita domestic water use estimate did not reflect the potential for additional conservation through the use of water conserving fixtures and appliances. In addition, the City of Newport News appears not to have sufficiently considered reliability-based planning incorporating drought management, which would allow a better assessment of the risk from future deficits.

Therefore, the panel concluded that the City of Newport News had not convincingly established the need for a 39.8 mgd increase in its water supply. IWR reviewed each section of the demand and supply projections and reported that certain assumptions underlying the forecast appeared questionable. Based on differences in population projections, employment structure, domestic, commercial and industrial water use calculations and conservation, the panel calculated a deficit of about 17 mgd by 2040. Since the safe yield is the amount of water available during an extreme drought, such infrequent supply shortfalls can be efficiently managed by infrequent demand curtailments and other less damaging sources. There is only a 1 to 2 percent chance that the drought of record will re-occur in any given year. Therefore, the panel concluded that the City of Newport News is not at risk if it does not increase its water supply at this time.

The IWR report recognized two major alternatives that are available to the RRWSG to meet the smaller deficit of 17 mgd and significantly reduce deficits and the risk of future water shortages. The Final Environmental Impact Statement outlines the RRWSG's long-term plans for the development of 4.4 mgd of fresh groundwater and 5.7 mgd of brackish groundwater supplies along with 7.1 to 11.1 mgd of conservation and use restrictions in addition to obtaining 23.2 mgd of safe yield from the proposed King William Reservoir. Therefore, the combined 17.2 to 21.2 mgd safe yield of the non-reservoir components would meet the 2040 deficit of 17 mgd. If both groundwater sources are used as planned, they could substantially reduce deficits and the risks of water shortages. In fact, Newport News' \$17 million dollar brackish groundwater desalination plant is now in operation and provides about 5.7 mgd of supply. (The Final IWR report further clarified that neither Newport News' calculation of a 39.8 deficit nor IWR's calculated 17 mgd deficit included conservation or water use curtailment. When IWR's estimated conservation benefit and water use restrictions from Newport News' Stage 2 Drought Plan are included, the 2040 deficit would be reduced to 4.96 mgd. The City's newly constructed desalination plant would eliminate this supply shortfall.)

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Late in the IWR study, the City of Norfolk revealed that it had a surplus of 32 to 45 mgd of water for sale because the City of Virginia Beach started using water from Lake Gaston exclusively in 1997 and no longer purchased water from them. The exact amount of this surplus and the length of time the water will not be needed by users in the southside of Tidewater has not been established. While IWR did not believe this water could be assumed to meet all of the RRWSG's long-term needs, if some or all of it is available in the near to mid-term, it would further diminish the risk of water shortages that the RRWSG would experience.

c. Newport News Rebuttal of IWR Report: On 16 July 1999, the City of Newport News submitted their rebuttal to the draft IWR report. During a meeting on 19 July 1999, the City and their water resources experts, Research and Planning Consultants (RPC), briefed me on their rebuttal. Also, in a letter dated 18 August 1999, RPC submitted additional comments on the IWR review of the City's water demand projections. On 17 December 1999, a meeting between the IWR panel, District staff and the City of Newport News was held at the IWR office in Alexandria, Virginia to provide an opportunity for the City to discuss the findings of the IWR report with the panel. At this meeting, Newport News' attorneys questioned each panel member concerning their contributions to the report and their support for its findings. Each member affirmed his unqualified support for the IWR report.

In a letter dated 30 March 2000, Newport News City Manager, Mr. Ed Maroney indicated that the City intended to submit to the District a new water needs assessment in support of the King William Reservoir and requested a 7-month extension (until 1 November 2000) in order to prepare their report. On 6 April 2000, I granted the City's request. Therefore, the Norfolk District's recommendation to the North Atlantic Division on the application had to be postponed until the information was received, reviewed and addressed in my recommended Record of Decision.

Newport News staff originally indicated that while they would like to have the final version of the IWR report, it was not likely to be very different from the draft and would not be needed for the preparation of the City's new water deficit information. However, in mid-August 2000, Newport News staff informed the project manager that the final IWR report was critical to the preparation of the new needs assessment. Accordingly, the District requested that IWR complete the final report as quickly as possible. The Final IWR report was submitted to the Norfolk District on 12 October 2000 and sent electronically to all interested parties on the same day. On 20 October 2000, the District granted the City's request for an additional 30 days (until 1 December 2000) in order to provide additional information in support of their project.

d. Final IWR Report: In the Final IWR Report, the panel's conclusions on water need remained basically unchanged. In fact, information developed since the draft report was released provided even stronger support for the recommendations contained in the draft report. Those findings are as follows: Newport News forecasted that in the year 2020, water use would exceed safe yield by about 27 mgd. However, this figure does not reflect the reduction in water use through long-term conservation because those figures are reported separately as a supply alternative. Accounting for long-term conservation reduces the 2020 deficit to less than 23 mgd. Since publication of the EIS, the City of Newport News has completed their proposed groundwater desalination plant which produces 5.7 mgd of high quality drinking water, thereby reducing the 2020 deficit further to about 17 mgd. Newport News estimated that Tier II drought measures would reduce water use by about 6 mgd, dropping the deficit to 11 mgd. Tier III of the Newport News drought plan would reduce the deficit even further to 5 to 6 mgd. The chance that this 5 to 6 mgd deficit will actually occur is the chance that the drought of record will re-occur, which is

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about 1 to 2% in any year. This assessment of risk was made in the draft IWR report using the RRWSG's assumptions and did not include other supply sources that Newport News had considered or transfers of water from the City of Norfolk.

Information received since release of the draft report allowed IWR to adjust their analysis. In the Final EIS, water use was forecast to grow by 10 mgd in the last decade. However, water use has actually remained flat and will be lower than IWR originally predicted. Also, James City County has announced plans to construct a 6 mgd groundwater desalination plant to open in 2005, rather than waiting for the outcome of the King William Reservoir permit application in order to solve their long-term water needs. This project was not among the alternatives that the RRWSG considered, but if built, would reduce the need for an additional surface water supply.

Furthermore, the IWR panel found even less evidence to support the use of 25% dead storage in the existing Newport News system. In past analyses, the safe yield of the Newport News system was calculated assuming 10 to 11% dead storage. However, in the EIS, the RRWSG calculated a lower safe yield based on 25% dead storage. A 1 March 1996 memo from DEQ states "Newport News could get a waterworks certificate based on 11.8% dead storage from the Health Department." The IWR panel acknowledged that water from the lower regions of the reservoir may be more costly to treat, but would provide a yield roughly equivalent to Newport News' new desalination plant, which costs \$17 million. Reducing the dead storage to previous assumptions would add another 7 to 10 mgd of safe yield and further reduce near term risk.

Also, Newport News predicted that the Big Bethel Reservoir would not be producing water in 2010, but offered no analysis to support its abandonment. The Final EIS described Big Bethel as an efficient source of high quality drinking water with a safe yield of approximately 2 mgd. According to the Fort Monroe website, the Army made a significant investment in 1997 to upgrade water treatment at Big Bethel. Furthermore, in a letter dated 14 January 1999 to the Norfolk District Commander, Air Force General Earnest O. Robbins II stated: "It is our understanding from conversations with (Fort Monroe Department of Public Works) personnel that Big Bethel will continue to serve Langley Air Force's needs and that the City of Newport News municipal system will be relied upon in case of emergencies or when additional water supply is required." Therefore, the IWR panel questioned the RRWSG's assumption that Big Bethel will no longer be in operation by 2010.

The Department of Health requires utilities to begin planning for additional supplies when water production reaches the 80% threshold, but does not require the construction of any particular alternative to provide those supplies. Based on discussions with the Health Department in December 1999 and a review of the Health Department's newly reorganized and clarified version of their regulations, the IWR panel concluded that its recommendations do not conflict with the so called "80% rule." Newport News Waterworks could pursue any alternative or combination of alternatives that would provide the additional supplies.

The IWR panel found the RRWSG's interpretation of a requirement to match safe yield to maximum daily water use as highly unusual. The RRWSG's analysis in the Final EIS failed to accomplish such a design capacity. Likewise, the Department of Health's own assessment that the addition of the King William Reservoir would meet the region's water needs through 2040 did not meet this design capacity. The IWR panel concluded that it is more likely that the requirement is for the design capacity of the treatment plant and transmission equipment than for the safe yield of the water supply itself. The Virginia

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Department of Health recently approved plans for improvements to increase the design capacity of the Lee Hall Treatment Plant which should assist Newport News Waterworks in meeting its maximum daily demand. In addition to Newport News' 5.7 mgd groundwater desalination plant already in operation, James City County plans a 6 mgd groundwater desalination plant in 2005. Therefore, the panel concluded that up to 11.7 mgd of additional supply would be available to the RRWSG long before 2040.

The panel found that the RRWSG's demand studies did not show an imminent need for additional water supplies and that the applicant's data and assumptions implied a very small risk of shortage by 2020. Subsequent information suggests that the risk may be even lower than previously stated. Although the IWR panel admits that no point forecast, including their own, represents the complexity of the situation, their analysis demonstrates that there is no immediate need to expand the City's water supply. Finally, the panel suggested that a collaborative risk assessment of future water supply need of the region be undertaken that would compare the costs, benefits and risks of a wide variety of supply and demand alternatives.

James City County proposed the Ware Creek Reservoir in order to meet their 40 year projected deficit of 7 mgd. Due to the EPA veto, the Ware Creek Reservoir was never built. James City County has been able to avoid their anticipated water supply crisis by implementing long-term solutions that do not require dependence on the proposed Ware Creek or King William Reservoirs. They have accomplished this by requiring more intense water conservation efforts (i.e., voluntary water conservation) and by planning for the construction of a 6 mgd groundwater desalination plant. However, James City County still supports the construction of the King William Reservoir and in their 14 September 2000 letter to the Regional Administrator of EPA, Bradley Campbell, they requested that EPA re-examine their oversight role for regulations to provide safe and reliable supplies of drinking water.

On 27 October 2000, the City of Newport News submitted a report entitled "Evaluation of Safe Yield Benefits From King William Reservoir Project" which re-calculated the safe yield of the King William Reservoir (KWR-IV) in consideration of the conditions and restrictions outlined in the Virginia Water Protection Permit. The report indicated that the treated water benefit of the reservoir to the RRWSG members would be between 19 to 21 mgd.

e. Newport News' Revised Needs Assessment: On 30 November 2000, the City of Newport News submitted an updated water needs report by HDR Engineering, Inc., entitled "Lower Virginia Peninsula Regional Raw Water Supply Plan Water Needs Assessment 2000-2050" confirming the City's contention that their earlier estimates of water need were not overstated and that the Peninsula will face a high risk of water shortages unless the King William Reservoir is built. This report acknowledges for the first time that water supplies in the 1990's had been more plentiful than predicted due to the development of new groundwater sources, and decreased demand as a result of higher water rates, conservation and wet weather. The report concluded, however, that even with conservation, regional water demands will exceed the available supply by 2010 and that there will be a 50% chance that the Peninsula will need an additional 22 to 27 mgd of water supply by 2050. This would be due in part to a steady growth in population over the next 50 years. However, the deficit may be as modest as 15 mgd or as large as 36 mgd depending on the rate of regional population and economic growth. The report stated that there is a 75% chance that even an additional 22 mgd supply will not meet the Peninsula's needs in 2050, and that the Peninsula will need even more than the 19 to 21 mgd that the reservoir would provide if there is a drought more severe than any in the last 70 years.

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The City also claimed that they would not be able to obtain permits for the 4.4 mgd fresh groundwater component of their plan and that without the reservoir, conservation measures and use restrictions would provide only 4.8 mgd of safe yield instead of the 7.1 to 11.1 mgd stated in the Final EIS. Combined with the 5.7 mgd from their new groundwater desalination plant, the City reported that the non-reservoir components of their plan would only provide 10.5 mgd of safe yield benefit rather than the 17.2 to 21.2 mgd reported in the FEIS. The City of Newport News also submitted a separate letter commenting that they had identified serious flaws in the IWR Final report. Newport News contends that “We have found that the conclusions reached by this panel in their final report are inaccurate and misleading and should therefore be discounted.” These reports and all other supporting documents supplied by the City of Newport News were forwarded to the IWR panel for review and analysis. Figure ES-1, below shows the City’s estimate of future water need.

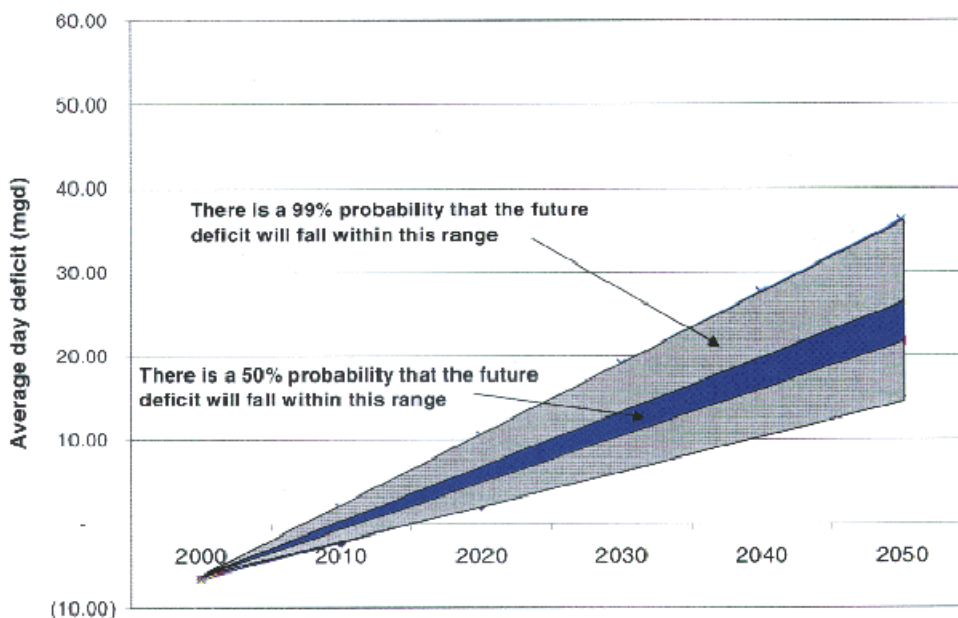


Figure ES-1. Estimate of Future Water Need, or Water Supply Deficit

f. IWR’s Review of Newport News’ Revised Needs Assessment: In their March 2001 report entitled “An Evaluation of the Risk of Water Shortages in the Lower Peninsula, Virginia,” the IWR panel reported on their review of the HDR report and supporting documents. The IWR review panel examined the assumptions, methods, results, and interpretations contained in the new studies submitted by the applicant. With the assistance of its consultants, the IWR panel replicated the demand, supply and deficit analyses of the applicant, both to verify reported results and to test the sensitivity of those results to key assumptions. The IWR panel found that its prior recommendation of a collaborative risk assessment for future water supply needs was at least partially satisfied by the new studies. For this reason, the IWR results and the results of the HDR study cannot be compared directly to any of the reports that preceded them. Previous reports compared point estimates of future water needs to the safe yield of the water

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system. The panel criticized that approach because it masks the real and potentially critical uncertainty in any long-term forecast. The panel feels strongly that the “deficits” reported in previous analyses are far less useful than information on “risk of shortage.”

The IWR panel’s estimates of future water use and supply were very close to those of HDR. The panel’s estimate of probable 2050 demands was about 5% less than HDR’s because the panel believed that HDR overestimated unaccounted for water and market penetration. The IWR panel’s point estimate of groundwater yield was the same as HDR’s, however the panel’s probabilistic estimate was a little higher because it allowed for the possibility of higher yields. The panel’s estimate of the safe yield of the current surface water supply was 56.7 mgd, as compared to HDR’s estimate of 56.5 mgd.

The most significant difference between the conclusions of the IWR panel and HDR analyses is in how the results were presented. HDR reports the probable difference between future water use and the minimum expected supply (safe yield). Safe yield is the minimum amount of water the system will produce over a long period of time during an extreme drought. The IWR panel has criticized this approach since the system will produce more water than the safe yield 98% of the time. Therefore, since actual supply will nearly always exceed safe yield, this approach exaggerates the risk of future deficits.

No one can accurately predict what water supply or water use will be in the year 2050 with any precision, but it can be said that the uncertainty about future water supply is different from the uncertainty about future demand, and the risk assessment must be structured to reflect those differences. IWR developed its own yield model for the five reservoirs in the Newport News Waterworks system to estimate the probabilities of satisfying various levels of demand in all years, not just the drought of record. The IWR panel’s supply forecast is a probability distribution of the full range of yields, from lowest to highest, so that the risk assessment can consider all combinations of supply and demand.

Therefore, the IWR panel reports on the percentage of risk that the supply will be inadequate, showing the probable difference between future water needs and future water supply – not just the safe or minimum supply. Figure 1 shows the risk that supply will be inadequate in each of the forecast years with no additional water supply under two assumptions; (1) 33% dead storage and no drought curtailments, and (2) 20% dead storage with drought curtailments. This analysis considers the worst drought in the twentieth century, as Virginia rules require. The risk percentages shown capture the full range of probable demand and supply, not just point estimates. As in their previous report, the IWR panel again pointed out that the FEIS estimate of safe yield of the system was based on a higher level of dead storage space (33%) than used in previous studies.

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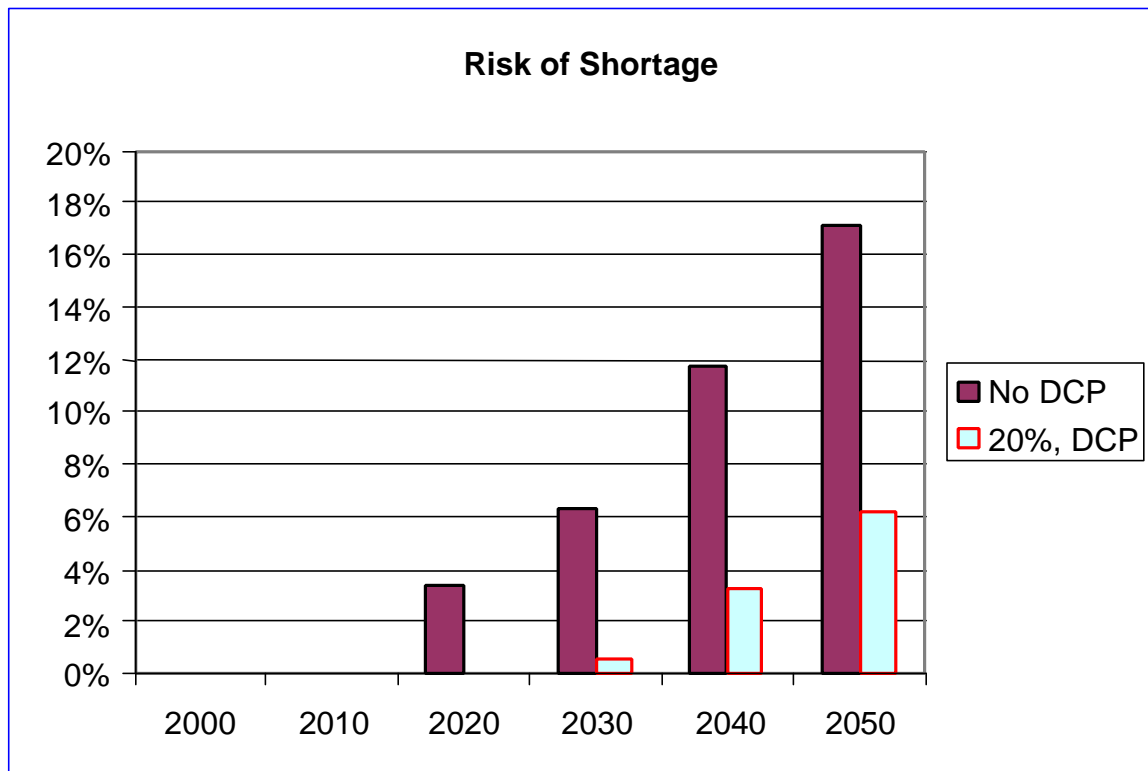


Figure 1. Probability That The Existing Water Supply Will Be Inadequate
(DCP = drought curtailment plan, 20% = 20% dead storage)

The November 2000 HDR report concluded that the region will need more water by 2010, based on Newport News Waterworks' use of 33% dead storage, and the Virginia Department of Health's rule that utilities not rely on drought curtailments to assess the adequacy of their supplies. Based on those two assumptions, the panel estimated that there is no risk of shortage through 2015 with existing supplies. The panel estimated that the region will need an additional 11 mgd of water supply by 2020 in order to have a zero risk of shortage.

The Virginia Department of Health has agreed to a much lower dead storage for existing reservoirs than the 33% used in the HDR calculation. Also, the City of Newport News has a drought contingency plan and has used drought curtailments. Therefore, the IWR panel considered HDR's assumptions on dead storage and drought curtailment to be at least arguable, so they also calculated shortfall probabilities assuming 20% dead storage and the use of drought curtailments. Based on these assumptions, both of which have been used in actual practice, the IWR panel estimated that there is no risk of shortage through 2025 with existing supplies.

(1) Drought Curtailment: Drought planning is the process of identifying an array of drought management measures, usually organized into several stages of increasing stringency; and defining trigger points that determine when each stage will be activated and inactivated. Sooner or later, every utility is faced with a potential deficit and must take various actions to prevent system failure. The deficit may arise from meteorological drought, from a contamination episode, or from pipeline or equipment

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failure. The actions taken in these circumstances – ranging from water use reductions to augmentation of existing supply capacity to emergency supply arrangements – are known as drought management measures. The Newport News Waterworks drought curtailment plan (DCP) provides for three tiers (stages) including voluntary measures (Tier 1) and a range of mandatory measures (Tiers 2 and 3) with specific triggers for starting and ending the curtailments.

For many years, water supply planners calculated future infrastructure needs by comparing forecast unrestricted water use to water availability under design drought conditions (usually the “drought of record”) with an unknown but small probability of recurrence. Assuming that the water use forecast and the hydrologic assumptions proved accurate, the result was a water supply system that would require drought management measures very rarely during the forecast period (only for events more severe than the design drought). However, as hydrologic modeling, water use forecasting, and risk analysis methods improved, it became clear that planning on the basis of an arbitrary reliability level risks substantial excess costs. Setting the reliability level too high requires the utility to provide costly, and possibly environmentally damaging supply works that will rarely be needed. Setting the reliability level too low means that costly, inconvenient, and potentially disruptive drought management measures will be implemented too frequently. The IWR panel believes that a preferable planning criterion is to minimize the total costs of supply and demand measures, achieving a balanced strategy of capacity additions and reasonable use of drought management, known as Strategic Trigger Planning.

Some drought management measures, when implemented occasionally, involve little more than mild to moderate costs and inconvenience for water users. These include the familiar, relatively low-impact restrictions on outdoor water use, voluntary reductions, increased recycling, accelerated leakage control programs, etc. The availability of such measures in time of drought will often produce significant and highly cost-effective reductions in long-term supply requirements. Typically, these measures are acceptable to the public (unless implemented too frequently) and less costly than the incremental supply capacity that would be required to avoid their use. The IWR panel believes that low-impact drought measures should always be considered in determining supply requirements, whether implemented through voluntary action or by regulation, because it so often makes economic and environmental sense to reduce use during occasional dry periods.

Since there were no benefit-cost analyses of drought curtailments in the HDR studies, the IWR panel used the existing Newport News drought plan and the panel’s safe yield model to determine how drought plans would extend the reliability of this water system. The panel found that the Newport News plan can increase the reliability of the current water system. In other words, if water use is curtailed occasionally during moderate to severe droughts, the system can support larger average demands without ever experiencing a shortfall. However, the already low outdoor water use in this region means that drought curtailment will not have the dramatic effect that is has in other regions of the country that rely on treated water for most domestic irrigation.

The panel then re-ran the simulation applying drought curtailments according to the rules and expected savings described in the Newport News drought contingency plan and allowed the reservoirs to drop to 20% dead storage to quantify the reduction in risk that would occur if the operators drew the reservoirs down more during droughts, recognizing that there could be additional water treatment costs. The panel also counted the frequency in which drought curtailments would be imposed.

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The frequency of drought curtailments for the 20%, DCP scenario is shown in Table 1, below. Between 2020 and 2030, the frequency of voluntary drought declarations would reach a level that might cause some public pressure for additional supplies. In 2020, voluntary lawn sprinkling bans would be required in 4 years out of every 100. By 2030, mandatory bans would be imposed in 2 years out of every 100, but voluntary bans would be imposed in 15 years out of every 100. The voluntary percentage is high, but probably could be adjusted lower with a refinement of the triggers used. However, if future water use were to attain the high end of the expected range, supply would be inadequate even with these plans in place. This creates the small risk shown in Figure 1 for 2030 for the 20%, DCP scenario. By 2040 even with drought curtailment there is 50/50 chance of a 4% risk of shortfall. The panel estimated that the region will need an additional 8 mgd of water supply by 2030 in order to have a zero risk of shortage.

Table 1 Frequency at Which Each Tier of Drought Curtailments are Imposed						
	2000	2010	2020	2030	2040	2050
Tier 1	0.03%	0.108%	3.4%	14.5%	45.9%	62.9%
Tier 2	0.00%	0.004%	1.3%	1.9%	4.0%	13.8%
Tier 3	0.00%	0.000%	0.5%	1.2%	0.0%	1.3%

(2) James City County Desalination Plant: The IWR panel also believes that since James City County has shown its intent to develop a desalinated groundwater plant, it should be considered in the District's alternatives analysis. The City of Newport News argues that the net contribution of the new plant to the yield of the system would only be 2 mgd, rather than 5 to 6 mgd as reported by James City County, because some of the freshwater wells would be abandoned. The panel's analysis of groundwater studies suggests that the current aquifer yields can be sustained, therefore, for planning purposes the expected yield of the desalination plant should be estimated to be between 2 and 6 mgd. Yield from this source would mean that the region will have adequate supply with zero risk of shortage for a few years beyond the dates noted above.

(3) Risk of Shortfall with Additional Supply: Because of the uncertainty regarding the net yield of the other supply sources, particularly the proposed James City County Desalination Plant, the panel estimated how various levels of additional supply would affect the risk of shortfall. Figures 2 and 3 show the risk that supply will be inadequate with additional supplies of 5, 10, 15, 20, 25 mgd under the two operational assumptions. Supply is considered inadequate in any year where water use is not satisfied in any month. Again, the analysis considers the worst drought in the twentieth century, as Virginia rules require and the risk percentages capture the full range of probable demand and supply, not just point estimates.

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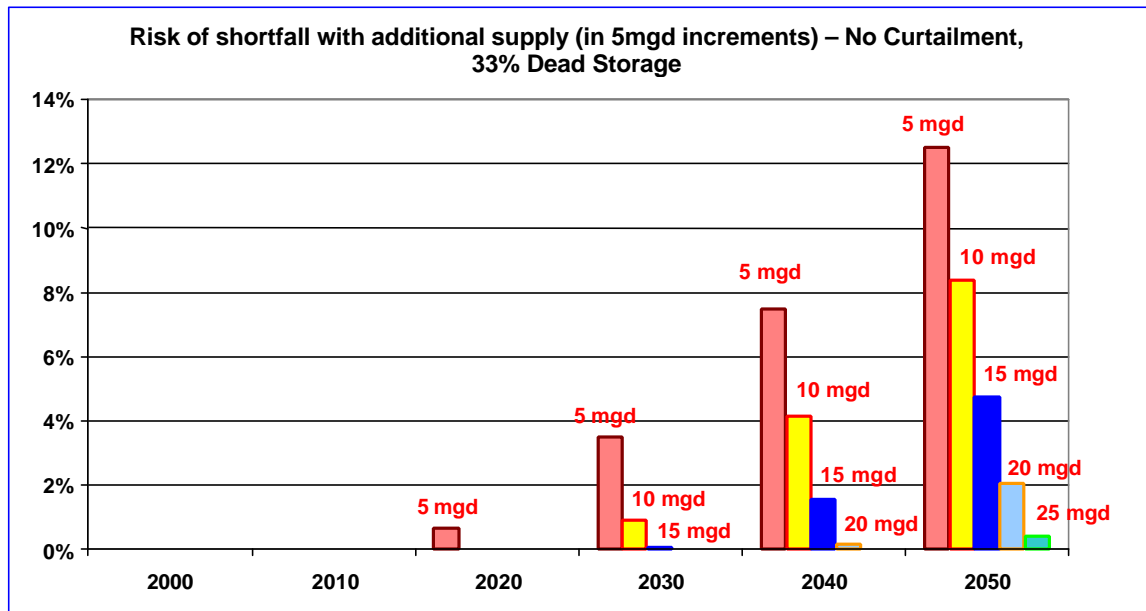


Figure 2. Probability That Water Supply Will Be Inadequate If Supplemented By New Supply, Assuming No Curtailment During Drought And 33% Dead Storage

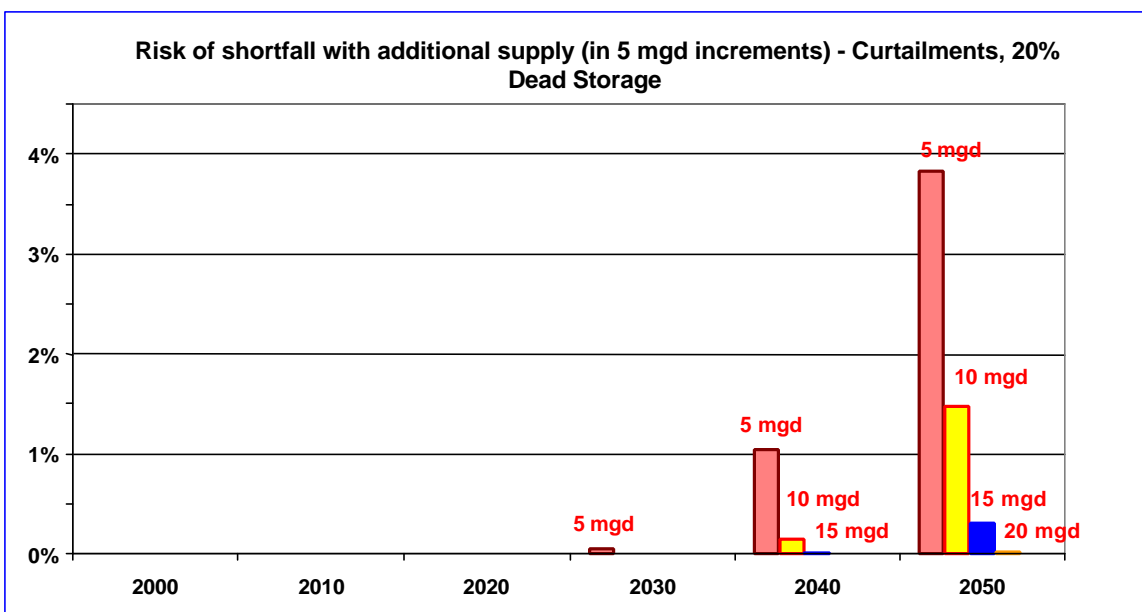


Figure 3. Probability That Water Supply Will Be Inadequate If Supplemented By New Supply, Assuming Curtailment During Drought And 20% Dead Storage

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(4) Additional Supplies Needed to Eliminate Risk: To reduce the risk to zero, the following amounts of additional water supply would be needed as shown in Table 2 and Figure 4 below:

Table 2 Additional supply needed to eliminate risk of shortage

	2000	2010	2020	2030	2040	2050
No DCP, 33%	0	0	11	17	25	32
DCP, 20%	0	0	0	8	16	23

(DCP = drought curtailment plan, 33% = 33% dead storage, 20% = 20% dead storage)

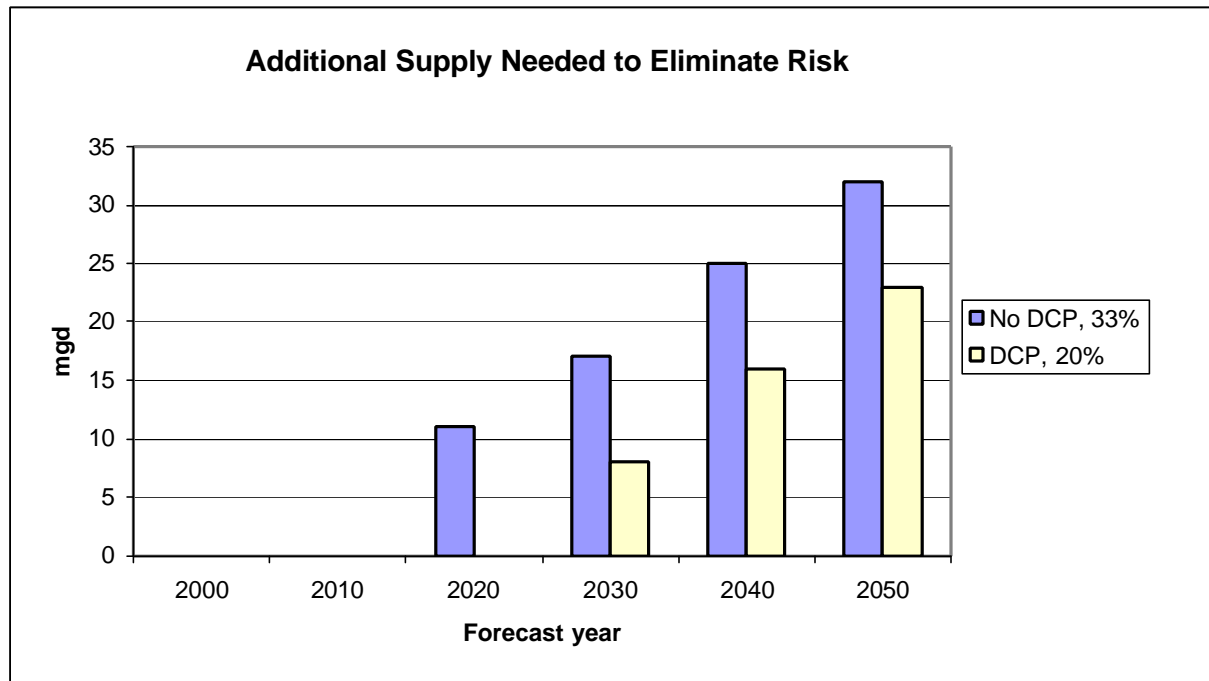


Figure 4. The amount of additional supply needed for zero risk of shortages

(DCP = drought curtailment plan, 33% = 33% dead storage, 20% = 20% dead storage)

These amounts correspond to the upper limit (worst case) of Figure ES-1 in the HDR Report. These values are derived from a risk assessment that assigned a range to each water use category to capture the uncertainty in forecasts. Zero risk means that this amount of water would satisfy the highest levels of water use in those ranges under any hydrologic conditions that had been experienced in the twentieth century.

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The panel found that if no new water sources are provided, the RRWSG service area will experience an increasing risk of deficit over the next 50 years. The IWR panel's results show that the RRWSG has demonstrated a need for some additional water supply in order to drop their risk of shortage to zero sometime between 2015 and 2030 depending on the operational criteria applied. Assuming that water use is not curtailed during droughts and reservoirs are not allowed to go below 33% full, this risk will not be perceptible before about 2015, and is likely to become clearly perceptible sometime after 2020. Based on the use of 20% dead storage and occasional drought curtailments, both of which Newport News Waterworks has used in actual practice, the panel believes the region will need an additional 8 mgd of water supply by about 2030 in order to eliminate all risk of shortage.

- No DCP, 33% Dead Storage: Unless the region suffers a drought more severe than any recorded in the twentieth century, the RRWSG would have enough water through about 2015 even without using drought curtailment or dipping into the lower third of their reservoir storage. The risk of shortage is as follows:

There is no risk of shortage through 2015 with existing supplies.

There is a less than 4% risk of a shortage by 2020. The maximum expected deficit by 2020 is 11 mgd (i.e., if water use is the highest expected, if groundwater yields are the lowest expected, and if there is a recurrence of the worst drought of the twentieth century).

There is about a 7% risk of a shortage by 2030. The maximum expected deficit by 2030 is 17 mgd.

There is about a 12% risk of a shortage by 2040. The maximum expected deficit by 2040 is 25 mgd.

There is about a 17% risk of a shortage by 2050. The maximum expected deficit by 2050 is 32 mgd.

- DCP, 20% Dead Storage: If drought curtailments are used and reservoirs are allowed on occasion to drop to 20%, then the region would have enough water through about 2025. Under these conditions, the risk of shortage is as follows:

There is no risk of shortage through 2025 with existing supplies.

There is a less than 1% risk of a shortage by 2030. The maximum expected deficit by 2030 is 8 mgd.

There is a less than 4% risk of a shortage by 2040. The maximum expected deficit by 2040 is 16 mgd.

There is a 6% risk of a shortage by 2050. The maximum expected deficit by 2050 is 23 mgd.

- James City County Groundwater: Since James City County has shown its intent to develop a desalinated groundwater plant, an expected yield of between 2 and 6 mgd should be considered as available water supply in the alternatives analysis. Any additional yield from this source would mean that the region will have adequate supply for a few years beyond the dates noted above for these two scenarios and the water would be supplied where it is apt to be needed most. Adding as little as 5 mgd of new supply drops the risk of shortage by 2020 to about 1%. Each additional 5 mgd supply increment significantly decreases the risk of future shortage. Combined with drought curtailments and 20% dead storage, as little as one 5 mgd supply increment (i.e., taking into consideration the James City County groundwater well) would reduce the risk of shortage to close to zero as late as the year 2030.

(5) Dead Storage and Safe Yield of the Newport News System: Both in the FEIS and the HDR report, the estimate of safe yield of the Newport News Waterworks system was based on a higher level of dead storage space in their existing reservoirs than used in previous studies or required by the Virginia

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Department of Health. This further limits the effectiveness of their drought contingency plans. Safe yield is generally calculated assuming reservoir capacity is diminished by dead storage. This space can be filled with years of sedimentation, and it can be more difficult or more expensive to treat water in the lowest elevations. The Department of Health previously determined that the safe yield of the Newport News Waterworks system could be based on the physically available storage of about 12%. (According to all reports, 10-12% of the reservoir capacity could not be used, at least not without extraordinary measures.) The Newport News system has about 13 billion gallons of storage, and Big Bethel and Waller Mill Reservoirs add another 2 billion gallons.

IWR developed their own safe yield models to determine the sensitivity of safe yield to the specification of dead storage volumes shown in Table 3 below. This includes safe yield from all existing reservoirs.

Table 3	
Dead Storage	IWR estimate of Safe Yield, all reservoirs
12%	70.8 mgd
20%	65.6 mgd
25%	62.2 mgd
33%	56.7 mgd

} 5.5 mgd } 8.9 mgd } 14.1 mgd

By using 33% dead storage to calculate safe yield of their system, Newport News Waterworks has discounted a significant amount of storage volume in their existing reservoirs that is available for water supply. By using 25% dead storage, an additional 5.5 mgd of existing storage within the system is available as safe yield. By using 20% dead storage, an additional 8.9 mgd of existing storage is available as safe yield. Using 12% dead storage, an additional 14.1 mgd of existing storage is available as safe yield. Newport News Waterworks' proposal to cease withdrawals at 33% of total storage volume is arbitrarily and unnecessarily conservative, and unreasonably inflates their apparent deficit.

Newport News Waterworks reported experiencing water quality problems when Diascund Creek Reservoir was drawn down to between 20 and 25% of total storage in 1983 and 1984. However, they did not report on the costs or the difficulties involved in treating this water. Even though it might be more difficult or more expensive to treat water in the lowest portions of these reservoirs, it would undoubtedly be less costly than providing a new water source, especially considering how infrequently it would be necessary. Furthermore, maintenance dredging of accumulated sediments in the bottom of the reservoirs could restore some of the storage volume that is lost over time to sedimentation and reduce the costs and difficulty of treatment.

(6) Need for Additional Water Supply: The Corps' Institute for Water Resources concluded that unless the region suffers a drought more severe than any recorded in the twentieth century, the RRWSG has enough water through about 2015 even without using drought curtailment or dipping into the lower third of their existing reservoir storage. Therefore, there is no risk of shortage through 2015 with existing supplies. The IWR panel estimated that using 33% dead storage and no drought curtailment, the region will need more water beyond 2015 in order to have a zero risk of shortage. By 2020, there is a less than 4% risk of a maximum 11 mgd shortage if water use is the highest expected, groundwater yields are the lowest expected, and there is a recurrence of the worst drought of the twentieth century. By 2030, the risk is about 7% for a maximum 17 mgd shortage. The risk increases to 12% for a maximum shortage

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of 25 mgd by 2040. In the year 2050, there is about a 17% risk of a maximum shortage of 32 mgd of water. The risk of shortage means the risk of needing to use drought curtailment, not that the region would run out of water.

Newport News Waterworks would use drought curtailment if needed during a drought as they have in the past and as any prudent utility would. Building the King William Reservoir would likely push the need for doing so again far into the future (barring emergencies), but at a significant environmental, social, and economic cost. I acknowledge the Virginia Department of Health's policy that utilities should not include drought curtailment when calculating the capacity of their supply systems, and that this policy would preclude Newport News from using IWR's drought curtailment scenario (as discussed above) to determine the 'official,' or rated capacity of their system. Although I did not rely on the drought curtailment scenario to justify my findings, I cannot ignore the reality that drought curtailment would be invoked if needed and would extend the capacity of Newport News' current system.

Referring to Figure 2, it can be seen that if Newport News Waterworks would use the existing reservoir storage volume of 5.5 mgd (at 25%), 8.9 mgd (at 20%) and 14.1 mgd (at 12%) in their calculation of safe yield, they would not need that same amount of safe yield from another future source, including additional storage space in a new reservoir. Utilizing as little as the 5.5 mgd of dead storage between 33% and 25% to calculate safe yield would reduce the risk of shortage to 1% by 2020, to less than 4% by 2030, to less than 8% by 2040, and to 13% by 2050. If Newport News Waterworks would utilize the 8.9 mgd of reservoir dead storage between 33% and 20% to calculate safe yield, there would be no risk of shortage by 2020, the risk of shortage would be reduced to less than 2% by 2030, to less than 4% by 2040, and to 8% by 2050. By using the 14.1 mgd of dead storage between 33% and 12% in their calculation of safe yield, there would be a less than 1% risk of shortage by 2030, a less than 2% shortage by 2040 and a less than 5% shortage by 2050.

I also believe that the 2 to 6 mgd of water from James City County's proposed groundwater desalination plant should be considered as a reasonably foreseeable future water supply and taken into consideration in the region's water supply planning. I also believe that the RRWSG has underestimated the expected yield of the aquifer. Yield from the James City County desalination plant would postpone the need by a few additional years depending on how much of the potential 6 mgd yield is actually realized.

Therefore, I have determined that the RRWSG will have no risk of shortage through the year 2015 with existing supplies. If water use is the highest expected, and if groundwater yields are the lowest expected, and if there is a recurrence of the worst drought of the twentieth century, there is a less than 4% risk of a maximum 11 mgd shortage by 2020. The maximum potential 11 mgd shortage calculated for 2020 could be satisfied by using the existing reservoir storage volume and the yield from the James City County desalination plant, and the region would have only a very small risk of shortage by 2030. Each additional 5 mgd supply increment (from some other sources) significantly decreases the risk of future shortage. I find that the RRWSG would not need any new water supply, let alone a new reservoir until after about 2030.

Determining the best time to begin construction on a new water project is a matter of judgment, involving consideration of risk of shortage, project costs, financial impacts, shortage costs, hardships to users and numerous uncertainties with respect to alternative strategies. The IWR panel believes that by using Strategic Trigger Planning as their planning criterion, the RRWSG can achieve a balanced strategy of capacity additions and reasonable use of drought management.

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(7) Water Needs for National Defense: Fort Eustis, and the Yorktown Naval Weapons Station rely on Newport News Waterworks for all of their water supplies. Langley Air Force Base and Fort Monroe obtain their water supplies from the Big Bethel Reservoir, but rely on Newport News Waterworks for emergency supplies. Each command has clarified their current and projected water needs based on the effects of military downsizing and base closures. There is evidence that the base closure and realignment has not had a major impact on the Peninsula except for a slight increase in military related employment.

In a letter dated 17 December 1998, City of Newport News Mayor Joe S. Frank wrote to General Richard E. Hawley, Commander, Air Combat Command, Langley Air Force Base, soliciting the support of Langley Air Force Base for the City's proposed King William Reservoir project. Mayor Frank's letter stated "We know that to support further consolidation of facilities to the Peninsula or to accommodate a military mobilization in response to a national security threat, requires that an adequate water supply infrastructure be in place."....and..... "To ensure that the needs of our local military installations are not overlooked in the decision-making, I ask that you convey to Colonel Carroll your thoughts on the importance of a reliable municipal water system to your mission at Langley Air Force Base."

In a letter dated 14 January 1999, Brigadier General Earnest Robbins, II, the Civil Engineer for Langley Air Force Air Combat Command wrote to me and attached a copy of Mayor Frank's letter to General Hawley. Brigadier General Robbins stated that Big Bethel Reservoir is operated and maintained by Fort Monroe's Department of Public Works which reported that the Big Bethel Reservoir will continue to serve Langley AFB's needs. He indicated that the City of Newport News' municipal water system would be relied upon in case of emergencies or when additional water supply is required. He projected no significant changes within the foreseeable future in the base's current average water consumption, and stated that "Any project necessary to ensure reliable water supply to Langley AFB while satisfying all environmental requirements is in the best interest of the Air Force."

The following comments were also received from commands at Fort Eustis, the Yorktown Naval Weapons Station and Fort Monroe:

Brigadier General Gilbert Harper, Commander of the U. S. Army Transportation Center at Fort Eustis stated in a letter dated 13 January 1999 that he expects his facility to show a gradual increase in military and civilian employment due to consolidations of other facilities caused by military downsizing. He stated that "A reliable source of water is absolutely critical to mission execution at Fort Eustis."

J. H. Cospers II of the U. S. Naval Weapons Station at Yorktown indicated in a letter dated 18 February 1999 that he did not anticipate any major growth of the facility, although there are some vacant facilities that could be filled by tenants. He also stated that "A reliable municipal water service is critical to the operation of WPNSTA Yorktown and to Navy families residing in the area."

In a letter dated 27 January 1999, Colonel Bobby A. Little, Post Commander of Fort Monroe, indicated that Fort Monroe possesses its own capability for satisfying the water needs of the installation, but routinely require an alternative source of water when minor problems develop in their treatment plant and distribution system. He indicated that Fort Monroe and Langley Air Force Base will likely not suffer much from reduction in personnel and base closures as they are major commands. He stated "If future demographic requirements justify the added capability obtained from the King William Reservoir project, Fort Monroe supports the initiative and highly encourages your approval."

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The RRWSG's November 2000 HDR report predicted a total military demand of 4.03 mgd in 2000, 4.01 mgd in 2010, 4.00 mgd in 2020, 3.98 mgd in 2030, 3.97 mgd in 2040 and 3.96 mgd in 2050. They attributed the decrease in future military water usage over time to on-base conservation, primarily the replacement of older fixtures. While each of these commands has a general need for an adequate and reliable water supply in order to fulfill their mission, they do not specifically need the King William Reservoir project for national defense. Any alternative that would reliably supply water to these commands would satisfy their needs.

8. Views of the District Commander Concerning the Probable Effect of the Proposed Work on:

a. Water Supply:

(1) Regional Raw Water Study Group Area: Newport News Waterworks currently has a system of five reservoirs which provide a total of 12.9 billion gallons (BG) of raw water storage (Diascund Creek Reservoir = 3.49 BG; Skiffes Creek Reservoir = 0.23 BG; Lee Hall Reservoir = 0.88 BG; Harwoods Mill Reservoir = 0.85 BG and Little Creek Reservoir = 7.48 BG.) The proposed King William Reservoir would provide an additional 12.2 BG of storage, thereby almost doubling Newport News' water storage capacity. Also, the City of Williamsburg operates the Waller Mill Reservoir (1.42 BG), and the Army at Fort Monroe operates the Big Bethel Reservoir (0.61 BG). Therefore, total reservoir storage for the RRWSG area actually equals 14.96 BG (see Map 2 - Regional Map). Domestic, commercial and industrial wells also provide water for much of James City County and York County. The James City County Board of Directors recently approved a plan to pursue a groundwater desalination facility to provide its own water supply if the Corps permit for the King William Reservoir was not issued by July 2000 and have now contracted for the first production well.

(2) Communities in the Mattaponi and Pamunkey River Watersheds: The applicant's regional water supply plan does not address the water supply needs of communities in the Mattaponi River and Pamunkey River watersheds, aside from the host allowances in the reservoir storage volume for King William County and New Kent County. In Virginia, water is allocated by the state on a first come, first served basis. Without a regional cooperation agreement, not all of the needs in a locality will be met by the resources available in that vicinity if they have already been allocated to a previous user.

King William County is not a member of the RRWSG, but is the host jurisdiction for the King William Reservoir. The host agreement gives King William County the option to reserve up to 3 mgd of the reservoir storage should they ever build the necessary pipeline, treatment plant and distribution system to use it. The King William County Businessmen's Association recently informed the District that according to the Agreement, the County would not only have to purchase the reserved raw water from the City of Newport News and construct the pipes, pump stations, treatment plants and distribution systems necessary to obtain the water, but they would also have to pay the City of Newport News a percentage of the total cost of the reservoir project (currently estimated to be approximately \$167.5 million dollars). The Association believes that these costs would prohibit the County from ever being able to take advantage of the water reserved for them.

Likewise, New Kent County is not a member of the RRWSG, but is the host jurisdiction for the pipeline connecting the King William Reservoir to the rest of the Newport News Waterworks system. A similar host agreement between New Kent County and Newport News provides 1 mgd of the reservoir storage for

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their future use. New Kent County indicated to the District in 1994 that they currently had no plans for using the water reserved for them in the reservoir storage.

According to the Final EIS, there are currently no substantial uses of the Mattaponi River basin for water supply. The Year 1990 estimated average withdrawal of water from the Mattaponi River basin was 4.64 mgd (71% is for domestic, commercial and institutional uses; 21% is for irrigation; and 8% is for industrial, manufacturing and mining purposes.) Approximately 3.1 mgd of this withdrawal is for consumptive use; that is, the water is not returned to the river. On the other hand, almost all of the 75 mgd withdrawal for the King William Reservoir would be a consumptive use to the Mattaponi River because it would be pumped to the reservoir in the Pamunkey River watershed and then transferred out-of-basin. Only the water discharged as a downstream release from the dam (and potentially the host allowances for New Kent and King William County) would return to the York River system. Furthermore, the users of the water are in the Lower Peninsula area where wastewater discharge would be into the lower York, Chickahominy and James River basins.

The King and Queen County Board of Supervisors is very concerned that the Mattaponi River would not be able to meet their future water supply needs if the RRWSG is allowed to take so much of the water. The proposed 75 mgd withdrawal represents approximately 15 percent of the estimated average annual flow of 484 mgd in the freshwater tidal area of the Mattaponi River at Scotland Landing. While this is a small percentage of the annual flow, the proposed withdrawal could effectively preclude the use of the Mattaponi River as a dependable water source by other jurisdictions and riparian owners (farmers) within the watershed. River water withdrawals must comply with minimum instream flow (MIF) standards imposed by the Virginia Department of Environmental Quality. During seasonal low flow conditions from June through October, the withdrawal schedule using the modified 80% Exceedence MIF could possibly transfer to the Lower Peninsula up to 40% of the total flow at Scotland Landing on a single day. This would be most, if not all of the water that exceeds the minimum instream flow of 114 mgd, leaving little or none for use of Mattaponi watershed residents. Under the less restrictive 40/20 MIF, pumping would be allowed when freshwater flows exceed 99 mgd; therefore, even less would be left for use by Mattaponi watershed residents. The County is also concerned that the encroachment of more saline water in the Mattaponi River could cause salt water intrusion into shallow aquifers especially at West Point.

The Caroline County Board of Supervisors is also opposed to the King William Reservoir because it would restrict their future use of the Mattaponi River for water supply. They feel they should be allowed to have their "fair share" of the Mattaponi River water. They also point out that the applicant's determination of Caroline County's need is based on a study that is more than 10 years old and no longer accurately reflects Caroline County's consumptive needs since growth has been faster than projected. Caroline County feels that groundwater systems within the County will be inadequate to meet their demand within the next few years and predict that by 2014, they will need their own surface water source to meet their demand.

Numerous farmers on the Mattaponi River use river water to irrigate their crops. The RRWSG's analysis indicated that crops currently grown by these farmers would be tolerant of the small predicted salinity increases brought about by the withdrawal. Therefore, they concluded that there would be no adverse impacts on irrigation as a result of withdrawals. The RRWSG's analysis is based on the results of the VIMS salinity study which did not consider the cumulative effects of other consumptive uses or the additive effect of the proposed withdrawals with natural, pre-existing salinity fluctuations. The

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RRWSG's analysis also did not appear to consider future increases in agricultural irrigation in the Mattaponi watershed.

b. Navigation, Present and Prospective:

(1) Mattaponi River: The Mattaponi River is navigable at its confluence with the York River and for some distance upstream. Based on historical records, the head of navigation for legal purposes is presumed to be the Guinea Bridge in Caroline County. It experiences moderate to heavy recreational use especially during weekends and holidays throughout the summer. The river is approximately 400 feet wide at the mean low water elevation in the vicinity of the proposed intake site. The proposed 180-foot long intake structure would be constructed parallel to the shoreline approximately 125 feet channelward of the mean low water line. A 72-foot long pier with an enclosed boathouse would be constructed adjacent to the intake structure to provide mooring and storage of a boat for use in water quality sampling and screen maintenance. The pier would extend approximately 20 feet channelward of the mean low water line. The intake structure would consist of six T-shaped pipes with a total of twelve screen-covered openings. The structure would be located in approximately 21 to 25 feet of water, providing a minimum of 7 feet of vertical clearance at mean low water. Although recreational craft should not be affected by the intake structure, the intake area would be marked by warning buoys. Sounding data indicate that the remaining navigable portion of the river is approximately 175 feet wide with a minimum depth of -7 feet at mean low water. Therefore, river usage by larger commercial or pleasure craft should not be restricted. The proposed intake structure and pier should not adversely impact navigation in the Mattaponi River.

(2) Cohoke Creek: The proposed reservoir is located in the non-tidal waters of Cohoke Creek, a tributary to the Pamunkey River. Recreational navigation occurs in the 85-acre Cohoke Millpond, an existing impoundment downstream of the proposed dam site, and in the short tidal reach below the Cohoke Millpond Dam adjacent to Route 632, but is not known to exist above the Millpond. The privately owned Cohoke Millpond is currently fed by approximately 16 miles of perennial streams and 14 miles of intermittent streams from the total 17-square mile drainage area. Water levels are maintained by the Cohoke Fishing Club through the use of a gate-controlled spillway, which feeds into a 30-inch culvert running under Route 632. Approximately 3,500 gallons of water per minute, or 5 million gallons per day, flows through the culvert into the tidal waters of the Pamunkey River under normal conditions. Average depths throughout the pond during periods of normal elevation are 5 feet. The proposed King William Reservoir dam would affect roughly half of the Cohoke Creek watershed and would reduce the volume of water entering the Millpond by approximately two thirds. This in turn would reduce the existing flow over the spillway to approximately 1,200 gallons per minute under normal conditions. However, this two-thirds reduction in the total water volume is not expected to adversely affect the Club's ability to control water depths or to navigate within the confines of the Millpond during normal conditions. Impacts to navigable capacity would be associated with abnormal drought events, but should be temporary in nature. Therefore, no adverse impacts to navigation in the Millpond are anticipated. No adverse impacts are anticipated to navigation in the Pamunkey River.

c. Flood Height, Drift and Flood Damage Protection:

(1) Mattaponi River: The proposed 75 mgd maximum daily withdrawal represents approximately 15 percent of the estimated 484 mgd average annual flow in the freshwater tidal area of the Mattaponi River at Scotland Landing (river mile 24), but could possibly represent up to 40 percent of the total flow in a single day during the seasonal low flow period. The total freshwater discharge at the

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mouth of the Mattaponi River is estimated to be 581 mgd. The mean tidal range at Scotland Landing is 3.56 feet. No measurable effects on tidal height or range or flood damage protection are anticipated. Water depths in the Mattaponi River would not be measurably impacted by the proposed withdrawals since the intake would be located in tidal waters.

(2) Cohoke Creek: Cohoke Creek is a tributary to the Pamunkey River. The Cohoke Creek watershed has an estimated drainage area of 17 square miles. The Creek's tributary system consists primarily of non-tidal perennial and intermittent streams. A 100-year old dam near the mouth of Cohoke Creek has created the 85-acre, privately owned Cohoke Millpond. Numerous beaver dams currently exist on approximately 8 miles of the creek above the millpond. No adverse effects on flood height, drift and flood damage protection are anticipated.

d. Erosion or Accretion:

(1) Mattaponi River: The relative elevation of wetlands to the river are maintained when there is a balance between sediment accretion rates and erosion and subsidence rates. Erosion and accretion could result in long-term changes to plant communities. The withdrawal of up to 75 mgd of water from the Mattaponi River would reduce kinetic energy from freshwater flows. This has the potential to alter erosion rates and suspended sediment loads. In their draft plan for monitoring changes to wetlands on the Mattaponi River, Dr. Arlene Darke and Dr. Patrick Megonigal of George Mason University (members of the River Monitoring Team assembled by the District) concluded that these changes would be expected to alter wetland geomorphology and the substrate available for plants, thereby contributing to changes in wetland community composition (see Section 8 k, Monitoring Plan).

Also, the Fish and Wildlife Service and the Virginia Department of Game and Inland Fisheries expressed concern that the proposed intake structure in the Mattaponi River could cause erosion or accretion of the adjacent marshes and potentially eliminate suitable habitat for the sensitive joint-vetch, a federally-listed threatened and state protected plant species. In an attempt to address this issue, the City of Newport News hired a coastal engineer to examine the potential indirect impacts of the intake structure on flow velocities and sediment depositional patterns in the Scotland Landing-Garnetts Creek Marsh area. The findings were presented in a September 1996 report entitled "Study of Potential Erosional Impacts of Scotland Landing, Water Intake Structure on Garnetts Creek Marsh, Mattaponi River, Virginia" by Dr. David R. Basco.

Dr. Basco's objective was to analyze the water velocities and sediment transport potential before and after intake construction to determine if a relative change in sediment potential would occur and to predict the extent of expected change in sediment deposition and scour patterns on the nearby marsh geometry. Due to time constraints, the study relied on existing information provided by Malcolm Pirnie, Inc. and a single site visit by Dr. Basco. The study was limited to the area immediately surrounding Garnetts Creek Marsh across from the proposed pump station and the sensitive joint-vetch colony on the south side of the Mattaponi River upstream of the proposed intake. The report stated, "...the increased mean velocities and sediment transport potential are so small that the possibility for excessive erosion of Garnetts Creek marsh and the south-side shore is minimal to non-existent" (emphasis added). Based on the findings of this report, the RRWSG has extrapolated from this statement that "the installation and operation of the intake will not alter any of the river's existing circulation patterns in a manner that would lead to increased erosion along its shoreline."

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Dr. Basco's report actually indicates that while erosion would not be expected to be excessive, small changes in flow and circulation would result in erosion and/or accretion of the shoreline. The report's findings were that the proposed intake would reduce the flow cross-sectional area by only 1.1 percent, but would present a blockage to secondary currents across the river bend that would result in a 2 percent increase in sediment transport potential which could enhance sediment settling at Garnetts Creek Marsh. The intake would increase the maximum tidal flood velocity by less than one percent, but would produce a wake region with increased turbulent kinetic energy that would impact the south-side bank both upstream and downstream of the intake structure. Turbulent wake would be created by the ebb currents and the secondary currents near the river bend where the pump station would be located. Sharp surfaces and edges of the intake screen would generate increased levels of turbulent energy when the ebb flows pass the screen, so that turbulence will be transferred downstream and will diffuse vertically to the surface and down to the river bed.

This increased turbulent energy could reach the sensitive joint-vetch area on the south side of the river, especially during elevated water and flood events. The south-side colony, which is subject to natural erosion processes from freshwater flooding events, may have increased levels of turbulence during daily cycles of the flood tide, consequently, increased erosion could occur. The report also indicated that a smaller wake would extend upstream during daily tidal flooding, and the area of turbulence caused by the water intake may reach the mean high waterline in the south-side colony. Dr. Basco noted that existing models could not predict the exact dimensions and energy content of the turbulent wake or what effects this increased turbulence would have on the species. These changes would be permanent and the effects would be continuous and cumulative. Therefore, he recommended monitoring the level of daily flood tide induced wake turbulence upstream, and monitoring of the south-side habitat after intake construction to determine if protective measures would be needed. Dr. Basco also suggested that monitoring after construction was the only way to evaluate the potential sources of erosion impacts. While I believe the potential for turbulence-induced effects would be minor, they cannot be completely discounted.

(2) Outfall on Beaverdam Creek: The applicant proposes to use Beaverdam Creek as an inter-reservoir conveyance channel for water pumped from the King William Reservoir to the Diascund Creek Reservoir. The 11.7 mile pipeline would terminate at a pre-cast concrete outfall structure with a 30-foot riprap apron. A 33-foot wide by 3-foot deep trapezoidal discharge channel would be excavated through 150 linear feet of vegetated wetlands to connect the outfall to the main channel of Beaverdam Creek. The outfall would be designed for a maximum discharge flow of 50 mgd (see Map 4 – Aerial Photo of Beaverdam Creek and Diascund Creek Reservoir).

In the RRWSG's original application, the outfall structure for the pumpover was located approximately 1.3 miles upstream of the normal pool elevation of the Diascund Creek Reservoir, in a third order stream segment of Beaverdam Creek on the north side of Interstate 64. Beaverdam Creek flows southward under the 60 to 75-foot wide concrete supported I-64 bridge. The Diascund Reservoir is located on the south side of the interstate. Normal pool elevation of Diascund Creek Reservoir is 26.0 feet at mean sea level. Elevation of the originally proposed outfall was 35 feet at mean sea level or 9 feet above normal pool elevation of the reservoir. The discharged water would flow through a small perennial low-flow channel for approximately 4,000 feet before entering a channelized portion of the Beaverdam Creek/wetland complex located approximately 500 to 600 feet upstream of the Interstate 64 crossing.

The District staff and the federal advisory agencies expressed concern that stream channel erosion could be significant, even if the released high flows stay within their banks. The U.S. Fish and Wildlife Service

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commented that repeated peak flows of this magnitude could severely degrade the biological integrity and channel morphology of Beaverdam Creek by causing scouring of the stream channel, channel downcutting, dewatering of the floodplain and channel widening. EPA provided similar comments. The Virginia Department of Game and Inland Fisheries commented that the Final EIS did not evaluate the impact of the increased frequency of high flows in Beaverdam Creek and that it is highly likely that increased flows would increase erosion, especially during periods of high flow. All three agencies recommended that the discharge point on Beaverdam Creek be moved to the Diascund Reservoir.

Based on those concerns, the District recommended that the RRWSG provide an analysis for inclusion in the Final EIS that would fully and completely evaluate the feasibility of extending the pipeline all the way to the receiving reservoir, rather than merely the applicant's previous statement that doing so would be too costly (\$4 million). The RRWSG failed to provide the requested evaluation for the Final EIS; instead they attempted to minimize the potential for erosion by extending the outfall location another 0.5 miles downstream, thereby reducing the impacted section of streambed to 0.8 miles. The RRWSG modified their application in December 1996 to relocate the outfall approximately 3,800 feet downstream to a point which is approximately 1 foot in elevation above the normal pool of Diascund Reservoir. The new location would be approximately 600 feet upstream of the I-64 crossing of Beaverdam Creek. The Fish and Wildlife Service, EPA, the National Marine Fisheries Service and the Virginia Department of Game and Inland Fisheries continued to recommend that the potentially significant adverse impacts to Beaverdam Creek should be avoided by extending the pipeline all the way to the Diascund Reservoir.

(a) Site Conditions of the Relocated Outfall Site: The relocated outfall structure would be situated within a transitional zone between a floodplain forested wetland and a highly diverse, mixed scrub-shrub, emergent and sub-emergent community. Dominant trees include red maple (*Acer rubrum*) and sycamore (*Plantanus occidentalis*). The herbaceous community consists of, in part, various species of smartweeds (*Polygonum* spp.), pondweeds (*Potamogeton* spp.), cut grass (*Leersia* spp.), sedges (*Carex* spp.) woolgrasses (*Scirpus* spp.), cattails (*Typha* spp.) and blueflag (*Iris virginica*). It is anticipated that species composition in the herbaceous layer would be substantially more diverse during the later part of the growing season as non-persistent species emerge. Soils at the site consist of a Johnston mucky loam; a coarse-loamy, siliceous, acid, thermic cumulic humaquepts. Johnston soils are very deep and poorly drained which are formed in loamy fluvial sediments. Beneath 2 inches of standing water, soils examined at the relocated outfall site consisted of a peaty muck "O" horizon 0 to 14 inches deep, a "Cg1" horizon of a dark brown fine sandy silt from 14 to 24 inches and a "Cg2" horizon of gray-brown medium sand from 24 to 54 inches. Clay content ranges from 2 to 20% depending on the horizon investigated. Permeability is moderately rapid (2-20 in/hr). Organic content for the Johnston series is high (8-18%). However, due to the landscape position where stream morphology and the cross sectional geometry flatten considerably compared to upstream segments, the organic buildup has increased significantly. This is due primarily to the long-term sustainability of this low gradient, low energy system situated in a broad flat alluvial plain within a relatively undisturbed, pristine watershed. The existing soil conditions at the discharge site, as evaluated by the District and U.S. Fish and Wildlife Service are consistent with the data presented in the Soil Survey of New Kent County. Statements advanced by the applicant on soil conditions are inconsistent with agency findings and the soil survey data itself.

It is recognized that channelization of a portion of Beaverdam Creek has removed the upper horizons of the pre-existing natural substrate. However, field inspection revealed that portions of the channel have filled in sufficiently to support lush emergent, sub-emergent and aquatic vegetative communities. This is the result of a slow accumulation of natural stream sediments and organic matter, accelerated to some

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degree by the construction of beaver dams which further slow normal water velocities. The channel does not contain “stiff clays that are resistant to erosion” as purported by RRWSG in the Final EIS.

(b) Impact Analysis: The underlying substrate in both the emergent and sub-emergent vegetated communities contains a high organic content which is indicative of conditions of a low energy system. The presence of beaver activity, both upstream and downstream of the proposed outfall, further supports the conclusion that this portion of Beaverdam Creek is a low energy system with wetland communities that are highly susceptible to potential changes in supporting hydrologic and hydraulic conditions, rates of stream erosion, turbidity and sedimentation. The sustained increase from 4.5 mgd to 32.6 mgd average annual flow would undoubtedly result in erosion and transport of easily removed components of the aquatic substrate, (i.e., organic material, silts and fine sands.) This would result in increased sedimentation rates within the upper reaches of Diascund Reservoir, decreased water quality from resulting turbidity and re-suspension of nutrients and pollutants.

The RRWSG characterized the proposed relocated outfall structure as being at “.....the upstream end of a man-made, riprapped channel constructed at the foot of an I-64 embankment fill section.” This is inaccurate as the channel is only lined on the south side immediately adjacent to and parallel with I-64. Placement of the structure was evidently intended to abate any naturally occurring erosional forces from storm events on the road embankments for I-64 within this section of Beaverdam Creek. This revetment extends to an area on the south side of the westbound lane where it terminates. The north and east sides of the man-made channel are unlined and thus exposed to erosional forces. Furthermore, the channel does not extend downstream to the open water portion of Diascund Reservoir. Rather, the man-made channel terminates approximately 100 feet south (downstream) of the eastbound lane of I-64. From that point, although reported to be within the normal reservoir pool elevation of 26.0 feet at mean sea level, water must actually flow through a series of braided channels and forested wetlands for approximately 1,600 linear feet before it enters the open water portion of the reservoir.

The RRWSG responded to concerns raised by the federal advisory agencies regarding environmental impacts associated with the relocated outfall. However, their rebuttal evaluated the discharge in terms of flow velocities per event for potential erosional impact rather than assessing flow volume, duration of peak discharge and frequency of peak discharge for potential impact on the existing wetland ecosystem. The RRWSG utilized the U.S. Soil Conservation Service’s TR-55 Graphical Peak Discharge method to model pre- and post high flow conditions. Current pre-project stream flow at the discharge point averages 4.5 mgd. Post-project peak discharge plus ambient flow would raise the discharge to 54.5 mgd. This would represent a 12-fold increase above existing average conditions. Average post-project flow conditions would raise the flow to 32.6 mgd, representing a 7-fold increase above existing average conditions.

The TR-55 is a useful model for application in small rural and urban watersheds to analyze peak flow scenarios. One of the model’s variables, Q (runoff depth in inches) is based on a 24 hour cycle. The F factor is an adjustment for ponds and swamps but can only be applied to ponds and swamps that are not along the main flow used to determine the time of concentration. Therefore, the data developed by the RRWSG utilizing the TR-55 methodology may not be accurate, since much of the upstream watershed is comprised of forested wetland swamps hydrologically supported by the stream modeled. Even if the model produced accurate results, it would only be applicable downstream to the point of discharge at the outfall structure, since flow from the pumpover is assumed to be continuous. Evaluation of the continuous hydrologic loading of this section of Beaverdam Creek must be accomplished utilizing other models in

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which the time of concentration and lag time are major variables. The purpose of such modeling would be to determine the magnitude of hydrologic change on the wetland resources in the near zone of the discharge structure and downstream to the open water of Diascund Reservoir, not to analyze potential erosional forces as was employed by the RRWSG. Additionally, the RRWSG did not take into account existing cross-sectional variations of creek morphology below the discharge point in their velocity calculations.

The RRWSG claims that increased flow velocities could be beneficial to aquatic life and support a wide assemblage of organisms by providing higher dissolved oxygen levels, higher nutrient flushing rates and greater saturation of the floodplain wetlands through recharge. It appears highly unlikely that the stream ecosystem would experience changes that would be beneficial. As existing fish and invertebrate populations are adapted to an average flow of less than 5 mgd, continuous flow events of 32.6 mgd or continuous peak flows of 54.5 mgd would likely change long-term species composition. The National Marine Fisheries Service expressed concern that excessive turbidity would reduce water quality in the Diascund Reservoir and Diascund Creek, affecting the anadromous fish that Diascund Creek supports, and channel enlargement would eliminate the diversity of water depths found in naturally meandering streams. The RRWSG has failed to substantiate their claims. It appears much more likely that the portion of Beaverdam Creek below the outfall would become a degraded system, by increased flow volumes and velocities similar to those streams subjected to excessive stormwater loading in urban areas, since the flow events would occur at a frequency in orders of magnitude above natural conditions.

The applicant offered to correct any erosional problems that developed by implementing such measures as the construction of check dams to dissipate flow velocities and reduce bank undercutting. According to the U.S. Fish and Wildlife Service, this position reflects a lack of understanding of stream dynamics, and that any attempts to correct stream morphology problems once they have occurred are unlikely to succeed.

The relocated outfall structure could also adversely impact a nesting population of the great blue heron (*Ardea herodias*), a species protected under the Migratory Bird Treaty Act. During a March 2000 site inspection District personnel observed a small initiating rookery of 4 nests located at the very site of the outfall structure. Great blue heron rookeries are very susceptible to human activity and disturbance and are usually only found in forested wetlands removed from the presence of human activity. Construction and operation of the outfall could force the nesting pairs from the rookery, causing nest abandonment. The RRWSG has failed to include any discussion regarding efforts to avoid or minimize impacts to this rookery. Construction and operation of the outfall structure and channelization of 150 linear feet of vegetated wetlands directly beneath a great blue heron rookery could induce unnecessary and, therefore, unacceptable impacts to the rookery. Relocation of the outfall structure further downstream would minimize or avoid impacts to the rookery.

Impacts to existing wetland resources through increased depth of water and duration would be anticipated. Changes range from slight modifications in community composition to complete loss of vegetated systems, depending on the depth and duration of increased water levels. Biogeochemical cycles, such as denitrification, organic decomposition and ferric iron reduction would be adversely impacted with increased rates of flow, alteration of both the anaerobic and aerobic layers of stream stratigraphy, and alteration of the phosphorus cycle through changes in sediment deposition and re-suspension.

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Operation of the pumpover with an average 7-fold increase above existing flow conditions in Beaverdam Creek would adversely and permanently change stream dynamics. Changes in stream morphology would result and this low energy system would experience degradation due to sustained increases in flow volumes and velocities. Increasing the average stream flow condition from 4.5 mgd to 32.6 mgd would generate damaging levels of sustained flow volume on downstream aquatic resources, including vegetated wetlands, fisheries and benthic populations. Sustained flow volumes would increase rates of erosion and subsequent deposition of erodible materials (including highly erodible materials such as organics and silts), and would potentially decrease water quality downstream to Diascund Creek Reservoir. The applicant has failed to demonstrate that increasing the magnitude of flow in Beaverdam Creek from an average daily flow of 4.5 mgd to 32.6 mgd would be beneficial to the aquatic ecosystem or that it would not be harmful. Also, the RRWSG has failed to demonstrate that these potential adverse impacts are unavoidable. (For a more detailed discussion of this issue, see the District's report entitled "An evaluation of the outfall on Beaverdam Creek.")

(3) Cohoke Creek: The existing Cohoke Creek vegetated wetlands perform some sediment retention, but sediment pulses are regularly transferred to downstream wetlands. This downstream transport of sediment is not only normal, but is essential for the natural maintenance of a healthy riverine system. Sediment that is normally transported and deposited downstream would be retained by the proposed King William Reservoir dam and lost to the Cohoke Creek system. The RRWSG estimated that approximately 85 tons of sediment per year would be retained by the proposed dam.

Similarly, the applicant developed a simple model that estimated that the proposed reservoir and the Mattaponi River pumpover would increase nitrogen loading by 44,507 pounds per year and increase phosphorus loading by 11,931 pounds per year above current nutrient loading rates in the Cohoke Creek watershed. The RRWSG counted any nutrient treatment of the pumpover volumes as a net benefit, but even discounting problems associated with trying to quantify the degree of assimilation within the reservoir, the net effect of the pumpover would be elevated nutrient levels in Cohoke Creek proper.

The RRWSG claims that this sediment and nutrient retention would be beneficial to the York River and the Chesapeake Bay. Whereas, in fact, maximizing sediment retention functions would actually be detrimental to the Cohoke Creek system, and the proposed reservoir could result in elevated nutrient loading to the Cohoke Creek watershed. As sediments are eroded downstream of the dam and not replaced by sediments from upstream, there would be an alteration of the streambed and floodplain, which would affect the extent and character of the downstream wetland system. Also, the proposed reservoir would disrupt the existing nutrient transport linkage between the Cohoke Creek headwaters and lower creek mainstem, and result in changes to nutrient loading to the Cohoke watershed. (A detailed review of sediment retention and nutrient assimilation appears in Section 8 f (2) (d).)

e. Water Quality:

(1) Mattaponi River: The Virginia Department of Environmental Quality (DEQ) maintains a water quality monitoring station on the Mattaponi River at the Walkerton Bridge, 5 miles upstream of the proposed intake at Scotland Landing. Recent data from the monitoring station indicates that water quality in the Mattaponi River is excellent. All surface waters within the Mattaponi River basin have been designated as "effluent limited" by DEQ and there are currently no designated major municipal or industrial discharges in the Mattaponi River basin. Current management of the Mattaponi system in a

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relatively undeveloped state with low consumptive uses has resulted in minimal impacts to both water quality and quantity.

(a) Minimum Instream Flow Requirements: The Corps of Engineers does not have the authority to allocate water by regulating the amount of water that can be withdrawn from a water body. That authority rests with the Commonwealth of Virginia. However, the Corps has the authority to require the maintenance of sufficient minimum instream flows to insure that impacts to water quality, fisheries, recreation, and navigation are minimized. (Regulatory Guidance Letter 85-7).

The Code of Virginia, Section 62.1-44.38(b) directs the Virginia State Water Control Board (VSWCB) to estimate, for each major river and stream, the minimum instream flows necessary during drought conditions to maintain water quality and avoid permanent damage to aquatic life. In this analysis, it is important to quantify the beneficial uses within the stream, which need to be protected. A full understanding of the extent to which the MIF is contravened under natural conditions, and the extent to which offstream uses may add to these contraventions is necessary for assessment of MIF conditions.

There have been many methods developed to generate instream flow recommendations. These methods analyze fisheries, recreation, aesthetics, power generation and wastewater assimilation to determine the amount of water necessary to protect instream resources. The analysis of higher spring or flushing flows is also necessary in order to assess the impacts to fish migration or the removal of fine sediments from the stream bottom. Impoundments often provide a dampening effect during extreme flows but also may eliminate the seasonal high flows necessary for ecosystem maintenance (VSWCB, 1986).

The Tennant (Montana) Method is one of the most frequently utilized instream flow assessments. According to DEQ, this method was developed based on the analysis of hundreds of flow regimes near USGS gauges in many states. The recommendations are based on many years of observations regarding the adequacy of various flow rates to meet the needs of aquatic resources. The VSWCB (1986) confirmed that much of the early research used to develop the method was conducted on eastern streams with geomorphological characteristics similar to those found in the Commonwealth of Virginia. The report also confirms that there is some level of consistency in the relationships between the width, depth and velocity of discharge of streams in different physiographic provinces.

Advantages of the Tennant Method are that it is quick, inexpensive, and easy to use. It uses an incremental approach because the relative health of the aquatic habitat can be evaluated for different flows. It can be extended to ungauged streams by averaging the flow recommendation values for gauged areas for a specified drainage area. The Tennant Method allows for either annual or seasonal assessment of stream quality by modifying the analysis to reflect periods vital to the health of aquatic life. The VSWCB (1986) stated that dividing the year into two 6-month periods corresponding to the wetter or dryer portion of the year may not be appropriate in Virginia since the critical periods may not correspond to high flow seasons. The District believes a more accurate use of the Tennant Method would be to divide the year into periods of critical life history stages to insure that necessary flows are adequate during these times of the year.

The 80% Exceedence Flow, another MIF methodology, is based on the monthly flow rate which has the probability of being exceeded 80 percent of the time during the period of record. The 80% Exceedence Flow can be modified to provide additional protection measures for instream resources and/or future demand needs for the watershed. The 80% Exceedence Flow also provides additional protection to

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instream needs as it utilizes median monthly flows as the basis for the MIF conditions rather than the mean annual flows of the Tennant Method. The fluctuating flows allow for additional MIF values during critical times of the year (i.e., anadromous fisheries migration or spawning periods, endangered or threatened species propagation, salinity intrusion periods).

The proposal by the RRWSG is stated in the Final EIS to be high flow skimming in order to avoid potential impacts when saline water naturally moves farther upstream during dry periods. In a letter dated 5 September 1996, Malcolm Pirnie, Inc. discussed the MIF proposal and concluded that the estimated tidal flow near Scotland Landing was over an order of magnitude greater than the estimated freshwater discharge. Thus, the influence of tidal flow at Scotland Landing would dominate hydrology and overshadow any potential effects of withdrawals on natural streamflow variability.

The FEIS utilized such a Modified 80% Exceedence flow for both the Pamunkey River withdrawal and the KWR-II reservoir. For the Pamunkey River, this flow was modified to include a minimum flow rate of 140 mgd which must be maintained when available, an additional 25 mgd for irrigation during the months of April to September, and an additional 40 mgd for possible future Hanover County withdrawals (FEIS, 3-10). For the Mattaponi River, the 80% Exceedence flow was modified to set up a minimum flow threshold of 108.5 mgd (lowest median monthly streamflow value (September) at Scotland Landing) and reserve an additional 5.5 mgd for the SWCB's projected Year 2030 consumptive uses in the Mattaponi River Basin (exclusive of potential use by RRWSG jurisdictions) (FEIS 3-11). The FEIS also states that, "Based on the Mattaponi River Basin streamflow records for the Water Years 1942 through 1987, it is estimated that the assumed Mattaponi River MIF (Modified 80% Exceedence flow) would allow some withdrawals to occur 69.6 percent of the time." In addition, the FEIS acknowledges that, "The Modified 80% Monthly Exceedence Flows MIF would better preserve the shape of the Mattaponi River's natural season hydrograph and establish monthly MIF levels which are higher for each month of the year."

The RRWSG proposed the use of the 40/20 Tennant MIF at KWR-IV in the FEIS due to the reduction in the total and available storage of 9.0 and 6.6 billion gallons, to provide for sufficient safe yield, and to allow more frequent withdrawals from the Mattaponi River. As the District staff could not make any determination of acceptability of specific permit conditions until the final permit decision, it should be noted that the District did not approve the use of the 40/20 Tennant method instead of a modified 80% exceedence MIF as asserted by the RRWSG. The District staff merely stated that the 40/20 Tennant method might be determined to be sufficient to protect resources in the Mattaponi River after conclusion of the reviews of impacts to anadromous fish and the sensitive joint-vetch. The FEIS stated that, "The KWR-IV reservoir configuration, in combination with other practicable project components, would provide sufficient yield to meet the RRWSG's projected needs if the originally proposed 40/20 Tennant MIF were retained for the Mattaponi River pumpover. If a more restrictive MIF were imposed, then the reservoir yield would not be sufficient to meet projected needs of the Lower Peninsula localities and host communities through the RRWSG's planning horizon." Safe yield is an accepted planning device, but it does not represent the actual amount of water available to consumers during a severe drought. In practice, water managers impose emergency restrictions well in advance of the point of total depletion to reduce the risk of failure to the system (FEIS, 3-8). The safe yield is based on the level of acceptable risk and management's conclusions as to the reliability and resiliency of the system to respond during critical dry periods.

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The calculations performed by the RRWSG utilized a minimum acceptable reservoir dead storage of 33.3 percent of the total storage. A model developed for Newport News Waterworks by Camp Dresser McKee (CDM) and referenced in the FEIS (3-9) calculated actual dead storage as 11.8 percent of the total storage capacity, which corresponds to the percentage of total storage within the existing Newport News Waterworks reservoirs from which water could not be pumped by existing pumping stations. Comparing the 33.3 percent dead storage level proposed by the RRWSG with the 11.8 percent actual dead storage calculated by CDM, the RRWSG plans to use only 76 percent of the available water in the reservoir and to hold 24 percent of the potentially available water in reserve. Therefore, the RRWSG has underestimated the true safe yield of the system. Furthermore, even if the default value of 25 percent dead storage is used instead of the CDM figure of 11.8 percent dead storage volume, Newport News Waterworks' preferred 33.3 percent dead storage still reduces available water by 11 percent. If the additional 11 percent of the available water is included in the assessment of safe yield for the KWR-IV reservoir, then the potential difference between the currently proposed 40/20 Tennant MIF and the Modified 80% Exceedence MIF would be negligible. Thus the RRWSG could provide additional safety margins within the Mattaponi River with no detrimental impact to the reservoir by utilizing the Modified 80% Exceedence figures.

Newport News claimed that the DEQ permit was unfairly restrictive, reducing by as much as one-third the amount of water they could withdraw from the Mattaponi River. They stated that DEQ's required Minimum Instream Flow and other conditions of the permit would provide only 16 mgd safe yield benefit and would "cripple the project." However, in a report dated 27 October 2000, the City of Newport News re-calculated the safe yield benefit of the KWR-IV reservoir configuration based on the conditions contained in the Virginia Water Protection Permit and determined that the reservoir would provide 19 to 21 mgd.

The Institute for Public Representation (IPR), representing the Mattaponi Indian Tribe, commented to the District that the proposed minimum instream flow presented by the RRWSG would have a negative impact on the shad population in the Mattaponi River. Since shad are of critical importance to the Mattaponi Tribe as both a source of food and income as well as a resource of cultural and religious significance, additional protection measures to minimize any impact to their population dynamics is something I consider to be warranted. The National Marine Fisheries Service commented that because anadromous and semi-anadromous fish populations in the Mattaponi, Pamunkey, and Cohoke Creek drainages are currently low, significant impacts to these species are not tolerable. In his review of potential effects of the proposed withdrawal on anadromous fish in the Mattaponi River, Dr. Greg Garman of Aquatic Resources, LLC, consultant to RRWSG, expressed concern that adequate stream flows and natural hydroperiods be maintained during the summer months to protect the riverine and riparian habitat for juvenile fish and suggested the maintenance of a more conservative minimum instream flow (MIF) than the 40/20 Tennant method proposed by the applicant for this critical period. The Virginia Department of Game and Inland Fisheries also recommended that the RRWSG adopt the Modified 80% Exceedence flow schedule as well as a time-of-year restriction during construction of the intake structure in the Mattaponi River from 15 February through 30 June to protect spawning individuals.

By letter dated 18 September 1998, the U.S. Fish and Wildlife Service submitted their Biological Opinion for the King William Reservoir project. As part of the Conservation Recommendations for protection of the federally listed threatened sensitive joint-ventch, the Service suggested, "The adoption of the minimum instream flow restrictions on raw water withdrawal from the Mattaponi River... which stipulate a

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Mattaponi River flowby regime (water amount left for instream purposes) of a Modified 80% Exceedence of each month's flow duration statistics." The Service stated that other flow levels could be investigated to provide additional water during several winter months. The Service noted that the proposed 40%/20% minimum flow did not have enough linkage to biological processes or historic flow regimes. In addition, many parameters beyond salinity levels affect the functioning of a tidal freshwater ecosystem since many riparian plants are adapted to seasonal timing components of a natural flow regime of flowering, seed dispersal, germination and seedling growth.

The agreement between the City of Newport News and King William County for the development of the King William Reservoir requires that the water surface elevation of the reservoir stay at the highest level practical to accommodate recreational interests. The City agreed to design and construct a boat ramp and floating pier to insure that recreational access will be maintained provided that the water surface elevation is within 15 feet of the spillway elevation. There are also monetary penalties involved if the reservoir surface elevation drops below this elevation for 6 percent of the calendar year. For this reason, the RRWSG will seek to maximize the withdrawals from the Mattaponi River in order to protect the recreational interests within the reservoir. This higher withdrawal rate may result in increased impacts to the Mattaponi River.

The RRWSG claims that there will be no adverse impacts to anadromous fisheries, wetlands, threatened species, or water quality as a result of the proposed withdrawal. However, because I believe the potential exists for impacts to these resources, the District developed monitoring protocols that would be included as a condition of a permit, if one were to be issued, to provide long-term data gathering and analysis (see Section 8. k, Monitoring Plan). Conclusive evidence will not be available until the various monitoring efforts and studies have been completed many years after the project is built.

Therefore, based on recommendations from the U. S. Fish and Wildlife Service for the protection of the sensitive joint-vetch, the concerns raised by the National Marine Fisheries Service and the Virginia Department of Game and Inland Fisheries for the protection of anadromous fisheries, the specific condition requiring this flowby in the Virginia DEQ's VWP permit, the availability of additional water utilizing the default value of 25 percent dead storage level versus the RRWSG preferred 33.3 percent of reservoir storage capacity for the KWR-IV reservoir, and the fishery concerns raised by the Mattaponi Tribe, I have determined that flow-bys based on the Modified 80% Exceedence rules for withdrawals in the Mattaponi River must be required if a Corps permit were issued. A detailed discussion of Minimum Instream flow appears in the District's "Analysis of Minimum Instream Flow Requirements for the King William Reservoir Project."

(b) Salinity of Mattaponi River Water: The proposed pumpover from the Mattaponi River would reduce the freshwater flow in the river and would shift the freshwater/saltwater interface upstream. The migration of more saline waters into freshwater zones presents a potential for the loss of tidal freshwater habitat and changes in wetland plant community composition, with resultant adverse effects on plant and animal species. These freshwater wetlands serve to protect water quality in the Chesapeake Bay and provide habitat for rare plant species, migratory waterfowl and anadromous fish. Potential impacts to the federally listed threatened sensitive joint-vetch and to the river's shad population are of special concern. Species diversity is also affected by changes in river salinity. Due to salt stress, the number of species of wetland plants commonly found in marshes decreases as salinity increases. Furthermore, reduced freshwater flows in the Mattaponi River could reduce kinetic energy and alter suspended sediment loads and erosion rates. Also, the upstream movement of the freshwater/saltwater interface

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could move the flocculation point, thereby affecting sediment deposition patterns. As these changes would affect the substrate available for plants, they would contribute to changes in the composition of wetland communities and fish and wildlife habitat.

Salinity in the tidal freshwater portion of the Mattaponi River approaches zero but is also influenced by the rise and fall of the tide, bringing salt water upstream. Salt concentrations in tidal waters vary from month to month depending on the amount of freshwater input from rainfall and groundwater discharge. Because salinity has been shown to be a limiting factor in wetland plant distribution within tidal marshes, an investigation of the possible impacts of the proposed freshwater withdrawal on salinity patterns and vegetative communities on the Mattaponi River was performed for the RRWSG by the Virginia Institute of Marine Science (VIMS). The results of the modeling effort are summarized in the 1991 VIMS report entitled "Tidal Wetlands on the Mattaponi River, Potential Responses of the Vegetative Community to Increased Salinity as a Result of Freshwater Withdrawal" by Hershner, Booth and Mitchell.

Using the long-term salinity intrusion model developed at VIMS, the applicant's environmental consultants, Malcolm Pirnie, Inc., simulated a salinity record for the Mattaponi River between 1942 and 1987 using historical and adjusted freshwater inflows. They then simulated a salinity record for the same time period including the RRWSG's proposed freshwater withdrawal scenario. Then, VIMS compared the predicted salinity patterns provided by Malcolm Pirnie, Inc. with the existing plant community distributions from the summer of 1990 and historical vegetation distributions from 1953, 1971, and 1987 aerial photography. Salinity in the tidal freshwater zone ranges from 0.0 to 0.5 parts per thousand (ppt), while salinity in the oligohaline zone ranges from 0.5 to 5.0 ppt. As plant distribution patterns correspond to salinity patterns, long-term changes in wetland distributions can be predicted in response to anticipated salinity changes. Wetland plants which have known associations with long-term salinities in these ranges were chosen for the VIMS study.

The applicant's simulated salinity record indicated that the proposed withdrawal would result in an upstream shift in the average salinity levels by about 1 kilometer (0.62 miles) and indicated only minimal salinity increases between adjacent transects for the RRWSG's proposed withdrawal scenario when compared with the historical salinity record over the same period. The mean annual salinity levels in the critical tidal freshwater-oligohaline transition zone were predicted to increase by about 0.1 to 0.2 ppt as a result of the proposed freshwater withdrawal scenario. The City of Newport News claims that this change in salinity would be miniscule when compared to natural salinity fluctuations from tides and droughts.

VIMS quoted previous researchers who have reported that natural fluctuations in mean salinities due to freshwater discharge and groundwater input as well as changes due to freshwater withdrawals have been known to have a significant long-term impact on wetland vegetation patterns. Although the actual salinity increase is predicted to be greater downstream, the percentage of change would be more significant upstream where the existing salinity approaches zero. While these increases might appear small, they will be sustained for as long as the withdrawal exists and will exacerbate any natural salinity increases during times of drought and/or during periods when the wind pushes the tidal water farther upstream. Furthermore, tidal freshwater and oligohaline wetlands are known to be more sensitive to persistent long-term salinity increases than are the more stable downstream mesohaline (5.0 to 18 ppt) wetland communities.

The authors of the VIMS report noted that the conclusions of their assessment were limited to the effects of only the single proposed withdrawal location at Scotland Landing under the modeled RRWSG

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withdrawal scenario and are not applicable to other withdrawal scenarios. In evaluating a single withdrawal from one river, the model did not address the dynamic relationship among the Mattaponi, Pamunkey and York Rivers. Also, the study did not assess the effects of any other withdrawal on the Mattaponi or Pamunkey River system, the cumulative effects of other consumptive uses, or the additive effects of any future potential withdrawals with natural, pre-existing salinity fluctuations. The model looked at the effects of infrequent salinity peaks due to storm events, but did not evaluate the effects of small, but more consistent daily peaks that may have a more profound adverse effect on plant communities.

There was significant public criticism regarding the validity of the conclusions of the simplistic, one dimensional VIMS salinity model because it relies on monthly averages rather than capturing salinity changes throughout a daily tidal cycle, and does not consider the vertical salinity gradient. Two substantive critiques of the results were received in response to the FEIS (Dr. Linda M. Huzzey of the U.S. Coast Guard Academy and Dr. Wu-Seng Lung of the University of Virginia, both on behalf of King and Queen County). Therefore, with the assistance of EPA, the Norfolk District contracted with the Corps' Waterways Experiment Station (WES) Coastal and Hydraulic Laboratory in Vicksburg, Mississippi to review the 1972 VIMS model and the Hershner, *et al.* report as well as the two critiques.

Because changes in mean salinity levels can have a significant long-term impact on vegetation patterns, WES believes that it is important to investigate the possible impact of salinity changes over a time scale of decades. WES concluded that the long-term approach taken by Hershner, *et al.* to assess the impact of the freshwater withdrawals on possible long-term vegetation changes was technically sound because hydrological conditions in the Chesapeake Bay vary both seasonally and on a long-term scale. They cited a report that showed dry periods dominated from 1951 to 1969 followed by extremely wet years in the 1970's and wide variations over the last 20 years. WES believed that Dr. Huzzey and Dr. Lung made valid statements in their criticisms, and agreed with many of Dr. Huzzey's concerns about the assumptions in the VIMS study. However, Dr. Huzzey's suggestion to run a 40-year simulation of a three-dimensional model on the Pamunkey, Mattaponi and York River systems would be a formidable task that would be both very expensive and time consuming. Considering the time and funding constraints of the permit process, WES felt that a three-dimensional model should not be required if it can be shown that salinity does not vary appreciably over the cross-section. Although the resolution was coarse (vertical 5 feet, longitudinal 2.5 to 4 km spacing), WES concluded that the VIMS' assumptions of lateral and vertical homogeneity appear reasonable. WES concluded that although the results from the VIMS one-dimensional model were averaged over cross-sections and tidal cycles, the model is adequate to address the impact of the freshwater withdrawals on salinity in the Mattaponi River.

WES recommended some limited three-dimensional modeling to fully justify their belief that the effects discussed by Dr. Huzzey would indeed be small. WES also recommended a re-run of the one-dimensional model to include the effects of anticipated known withdrawals from both the Pamunkey and the Mattaponi Rivers to assess the cumulative impacts of consumptive withdrawals to the York River. The applicant's environmental consultant, Malcolm Pirnie, Inc. performed the recommended analysis and concluded that the overall mean salinity level would increase by no more than 0.01 ppt from the previous Mattaponi River withdrawal scenario, overall mean and maximum salinity levels increases would be one percent or less, and the predicted mean salinity levels would be less than the historical mean salinity levels at adjacent downstream transects. From these results, Malcolm Pirnie, Inc. determined that the conclusions from the 1991 Hershner *et al.* study should apply to the Mattaponi River when projected Pamunkey River withdrawals are included in the analysis.

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WES clarified that since a numerical model is an abstraction and only an attempt to represent nature, certain natural processes can be reproduced, while others cannot. Therefore, the modeler must select a model that will be adequate for the needs of a study, and must determine which processes are important, then make sure those processes are correctly simulated. WES stressed that predictions should not be made beyond the range of conditions for which the model was calibrated. Although WES found both the VIMS model and methodology to be appropriate, it should be noted that WES did not independently validate, or even comment on, the conclusions drawn by the RRWSG in interpreting the results of the VIMS model.

Based on the RRWSG's simulated salinity records, the VIMS report anticipated little or no upriver shifts in the distribution of existing wetland vegetation as a result of the predicted upstream salinity shift. The model predicted that the proposed withdrawal of freshwater also would not significantly increase the total number of days or percentage of days in which seasonal mean salinities exceeded the long-term salinity tolerances of the wetland plant community types studied. From the VIMS report, the RRWSG has concluded that freshwater withdrawals from the Mattaponi River would be immeasurable and inconsequential, and would not result in any impacts to fish and wildlife resources including tidal freshwater invertebrates, anadromous fish and the sensitive joint-vetch. They have made a similar claim concerning the Pamunkey River and its resources. It should be noted that the VIMS report addressed only the predicted spatial distribution of existing wetlands, and did not evaluate the effects of the upstream salinity shift on any fish and wildlife resources or endangered and threatened plant or animal species. Therefore, the RRWSG's extrapolation of the VIMS finding to these resources is unsupported.

The U. S. Fish and Wildlife Service commented that the Mattaponi and Pamunkey Rivers possess outstanding resource values which are at risk from salinity intrusion. The Service also cautioned that while accurate, the RRWSG's statement that "Natural Mattaponi River salinity fluctuations greatly exceed any salinity changes that were predicted due to withdrawals" should not be misinterpreted to mean that as long as changes stay within the range of natural variation, salinity changes are not detrimental. Both the Fish and Wildlife Service and the Virginia Department of Conservation and Recreation commented that some organisms and life stages have a much lower threshold for negative effects from chronic exposure to increased salinity or higher frequency of occurrence. During certain life stages, some species may be harmed by acute salinity impacts that would occur during maximum pumping events. The Service commented "The use of 'average pumping rate' obscures the model's ability to detect detrimental salinity changes on benthos and aquatic animal species because significant departures from baseline may be found when pumping occurs at maximum rates." Organisms in the low-salinity upper estuary may be particularly at risk for impact from very slight changes in water chemistry as some of these freshwater and estuarine species may already be at the edge of their physiological tolerance. Even a change in salinity as slight as 0.1 ppt could cause a significant decrease in growth and reproduction for these organisms. Also, a variety of plant metabolic processes, including germination, nutrient uptake, productivity, seed production, and community establishment are known to be affected by salinity. Salinity is an important growth-limiting factor in wetland species and the effects of salinity on function and anatomy may vary during various plant developmental stages.

The Virginia Department of Conservation and Recreation further commented that salinity alone is not an adequate variable for predicting all effects of the withdrawal of freshwater on plants and animals. Freshwater withdrawal may result in changes to water chemistry, including concentrations of macro- and micro-nutrients such as nitrogen, phosphorus, potassium, iron, cobalt and dissolved organic carbon as well as major inorganic elements such as chloride, sodium, magnesium, sulfate, calcium, and bicarbonate. The U. S. Fish and Wildlife Service commented that the VIMS study does not answer all questions on the

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potential salinity intrusion impacts on aquatic plants and organisms from project withdrawals and other cumulative withdrawals in the York River system. In their 28 March 1996 comments on the Supplement to the Draft EIS, the Service stated "The Service has serious concerns with the accuracy and validity of the conclusions drawn from the applicant's salinity modeling efforts." and "The numerous errors and omissions in the salinity modeling presented in the DEIS/SEIS do not allow conclusions to be drawn about the impacts of salinity intrusion on the Federally threatened sensitive joint-vetch or other fish and wildlife resources." The Fish and Wildlife Service further stated that "Encroachment of higher salinities would affect large portions of the Mattaponi and Pamunkey Rivers and detrimentally impact fish and wildlife resources and their habitats as freshwater tidal zones are reduced. The concept that marsh communities and fish spawning habitats could readily migrate upstream with salinity changes is likely false due to a variety of unsuitable habitat features or barriers."

(2) Pamunkey River Water: Although the freshwater flow on the Pamunkey River itself may not change appreciably from the reduction of freshwater input from Cohoke Creek, salinity changes at the confluence of the Mattaponi and Pamunkey Rivers could affect the location of the freshwater/saltwater interface in the Pamunkey River as well. This change has the potential to result in adverse effects on plant and animal species in the Pamunkey River, but to a lesser degree than those expected in the Mattaponi River. As in the Mattaponi River, of particular concern are potential effects to anadromous fish spawning and reproduction and rare plant species such as the sensitive joint-vetch.

(3) Cohoke Creek: Roughly half of the total 17 square mile drainage area (8.9 square miles) would be affected by the impoundment and the flow pattern of Cohoke Creek would be significantly and permanently altered. The impoundment would inundate approximately 21 miles of free-flowing streams (9 miles perennial, 12 miles intermittent) and reduce the average flows to the Pamunkey River by up to 5 mgd. The net reduction in freshwater discharge below the dam would restrict stream flows to about one third of the existing average flow and would result in adverse impacts to the wetland vegetation and the fish and wildlife that Cohoke Creek and Cohoke Millpond support. The RRWSG claims that flow rates downstream of the dam would not change appreciably because their release schedule would attempt to mimic natural downstream flow in Cohoke Creek. Nevertheless, I believe the presence of a new large impoundment would permanently alter the existing flow regime and associated processes of sediment transport, channel-forming and channel-maintaining flooding events and the timing and magnitude of flood flows.

In addition to short-term water quality impacts from increased turbidity associated with land clearing and dam construction, long-term water quality characteristics of Cohoke Creek downstream of the proposed dam are expected to be adversely impacted by the average two-thirds reduction in flow volume from the impoundment. Long-term water quality changes are expected from filling the impounded area with Mattaponi River water. The vast open water expanse of the proposed reservoir is estimated to result in a minor increase in atmospheric deposition of nitrogen and phosphorus to the aquatic environment. As the majority of the water in the reservoir would be pumped from the Mattaponi River, elevated nutrient concentrations in the reservoir are expected; however, how that change would affect nutrient loading to Cohoke Creek cannot be determined. Since the applicant proposes to avoid Mattaponi River withdrawals when salinity levels are elevated at the intake, significant changes in chloride levels in the reservoir would not be expected.

Also, stratification of the reservoir water, especially in summer months, could lead to anoxic conditions and low temperatures at the bottom of the reservoir. Downstream water quality problems and associated

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fish kills could result from the release of water from the lower levels. Therefore, it is unlikely that water quality in Cohoke Creek and the York River Basin would improve as a result of this project as claimed by the RRWSG. The Virginia Department of Game and Inland Fisheries recommended that downstream releases from June to October should contain at least 75% epilimnetic water to prevent temperature shock to stream fish during the summer and to prevent excessive discharges of anoxic hypolimnetic water that could stress or kill fish in Cohoke Creek. They also recommended a monitoring program to document shifts in water temperature and dissolved oxygen below the dam.

The RRWSG proposes a multilevel release of water from the proposed KWR-IV dam at elevations to protect downstream water quality. A condition of the DEQ VWPP requires that the RRWSG prepare an operations and maintenance manual for DEQ approval that would specify the procedures, measurements and calculations that would be performed to ensure that the release of water from the dam to Cohoke Creek would not cause the violation of water quality standards for dissolved oxygen, temperature or pH. The District has not seen this manual. Although this condition would aid in the protection of water quality, the District and the advisory agencies continue to emphasize that the volume of water released to the downstream system is vital to maintenance of the wetland system located downstream of the proposed King William Reservoir.

(a) Downstream Releases: Concern for maintaining the existing hydrologic regime for downstream wetlands has been raised by the District and the advisory agencies. In their 25 July 1997 letter, the U.S. Fish and Wildlife Service expressed concern that all or a portion of the wetlands downstream of the KWR-IV dam would be impacted by inappropriate flow regime for reservoir releases. In a letter dated 22 July 1999, the Service indicated that they were still concerned the RRWSG's plan for downstream releases did not avoid impacts to the functioning of downstream wetlands. In a report entitled "Evaluation of Potential Downstream Effects from King William Reservoir", the applicant described a modified schedule for downstream releases which they contend would mimic the natural downstream flows in Cohoke Creek and would afford a high degree of protection for the downstream ecosystem. The RRWSG's modified downstream release proposal is to release an average of 2.5 mgd during normal higher reservoir pool condition and a 1.5 mgd average annual release would be used when the King William Reservoir storage declines to less than 80 percent (which equates to a reservoir pool elevation of approximately 92 feet at mean sea level). These releases would be equal to about one third of the existing estimated 6.2 mgd average flow at the dam site. The proposed downstream release would represent only about one-third of the existing stream flow at the dam location.

The Virginia Department of Game and Inland Fisheries commented that research has shown that a reduction in stream flow of this magnitude would not be adequate to protect the fish populations or adjacent wetlands. Therefore, they recommended that the discharge flows be revised to maintain median monthly flows in Cohoke Creek. The U.S. Fish and Wildlife Service also expressed concern that the proposed release would be inadequate and recommended a more variable year-round release which mimics the natural variation in the hydrograph. The Cohoke Club's recreational fishing for bass, crappie, brim, catfish and perch in the Cohoke Millpond could be adversely impacted by changes in water quality and decreased freshwater input into the millpond. The reduced freshwater flow from Cohoke Creek into the Pamunkey River coupled with the reduced freshwater flow from the Mattaponi River could change the salinity at the confluence of the two rivers and affect the location of the freshwater/saltwater interface in the Pamunkey River as well.

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(b) Assessment of Proposed Cohoke Creek Flow-By Requirements: Regardless of the release schedule implemented for the King William Reservoir, the mere fact that a dam would be placed across Cohoke Creek assures that the existing flow regime and associated processes would be permanently altered. The Corps public interest review requires that impacts to recreation, navigation, water quality and fisheries are minimized through the maintenance of minimum stream flows. The following is the District's evaluation of the flow-by requirements for protection of these resources in Cohoke Creek below the proposed KWR-IV dam.

In a 1995 paper entitled "Downstream Ecological Effects of Dams", Ligon, Dietrich, and Trush stated that by changing the flow of water, sediment, nutrients, energy and biota, dams interrupt and alter most of a river's important ecological processes. They suggest that geomorphological changes are the key to understanding the long-term ecological consequences of dams and other stream disturbances. In order to fully understand the geomorphology of the pre and post- dam ecosystem, they recommended that researchers characterize and quantitatively describe both the channel and the watershed, monitor the water and sediment discharges, develop pre-and post dam sediment budgets and hydrology figures, model the effects of the dam on downstream bed elevation and grain size, and attempt to predict the channel responses to the dam using both theoretical and empirical models. In their paper "Landscape Scale Influences on Stream Habitats and Biota", Richards, Johnson, and Host (1996) concur, stating that the biotic composition of streams is strongly influenced by physical habitat. Once these changes have been characterized, the next important step is mitigating the unavoidable impacts.

In the 1996 paper entitled "Assessing the Ecological Effects of Habitat Change: Moving Beyond Productive Capacity", Jones, *et al.* identified a set of four objectives which review the ecological effects of habitat changes. These factors include the maintenance or optimization of fishery resources, the protection and conservation of healthy ecosystems from the effects of human activities, the preservation of pristine or undisturbed natural systems, and the restoration of degraded ecosystems to a healthier state. Each of these factors must be taken into consideration in the design of downstream releases for the King William Reservoir.

White developed a spreadsheet database from an indexed bibliography on stream habitat improvement to identify the frequency of occurrence of subjects related to stream habitat management in his 1996 paper entitled "Growth and Development of North American Stream Habitat Management for Fish." He identified several major categories which need to be considered in protecting or restoring stream habitat. These categories include stream habitat components (i.e., riparian vegetation, streamflow discharge, channel morphology, aquatic vegetation), stream fauna (invertebrates, fish, beaver, other vertebrates), human activities (sediment runoff/deposition, timber harvest, damming/impoundment), habitat management (streambank stabilization, in-channel structures, vegetation management), habitat assessment (biological survey, in-stream flow needs studies), biological aspects (fish ecology and behavior, habitat quality, riparian ecosystems), physical aspects (hydrologic changes), and other human aspects (land use, recreation, political, aesthetic, and legal). He concludes that consideration of management for ecosystems will permit management of human affairs while allowing these ecological systems to function at their highest level.

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The Virginia Department of Environmental Quality, in their Virginia Water Protection Permit dated 22 December 1997, required the following minimum release:

“The permittee shall maintain a minimum release below the dam at Cohoke Creek equal to the median monthly flow of Cohoke Creek at the dam site. The median monthly flows for Cohoke Creek at the dam site shall be calculated as a part of the development of the operations and maintenance manual required for DEQ approval by Special Condition B.7 of the permit. This minimum flowby shall be maintained during filling of the reservoir as well as after the dam is completed and the reservoir is filled.”

This condition was implemented based on the recommendations of the Virginia Department of Game and Inland Fisheries for protection of the downstream habitat resources. The RRWSG objected to this proposal because they felt that it would reduce the safe yield of the reservoir by 3.8 mgd. The Norfolk District, in the evaluation of the project, reviewed the DEQ permit and the following specific details in order to assess the specific requirements that would need to be incorporated into the downstream releases. It should be noted that the RRWSG must comply with the most restrictive conditions of any permit.

The initial flow-by for the KWR-IV location identified in the FEIS (pages 5-17) was 2 mgd during the high flow periods and 1 mgd during the low flow periods. The average stream flow identified in the FEIS (pages 4-19) was 6.2 mgd for the KWR-IV configuration. The FEIS (pages 3-15) also identified the reservoir seepage losses from the King William reservoir to be 2 mgd. Several concerns regarding this flow-by requirement were raised by the federal and state advisory agencies. In March 1998, a revised proposal was submitted to the Norfolk District by the City of Newport News (dated 19 January 1998). This revised proposal slightly modified the releases identified in the Final EIS by adding a 0.5 mgd flow, which is attributed to seepage from the dam, to both the higher and lower storage flow-by levels (2.5 mgd during high flow and 1.5 mgd during low flow). This seepage rate conflicts with the 2 mgd figure identified in the FEIS. The FEIS reported an estimated existing 6.2 mgd average stream flow at the dam site. However, in the revised RRWSG document, the average flow at KWR-IV was reduced to 5.7 mgd.

There is no documentation of the 0.5 mgd difference between the FEIS and the revised plan. The revised proposal seems to put the releases in a more favorable light, as the higher pool conditions would result in an effective release of 44 percent of existing average flows and the lower pool conditions an effective release of 26 percent. Utilizing the 6.2 mgd average stream flow as identified in the FEIS, the higher pool conditions result in a 40.3 percent effective release and during the lower pool conditions an effective release of 24.2 percent. In addition, the seepage figure identified in the revised flow-by proposal (0.5 mgd) conflicts with the figure identified in the FEIS (2 mgd). If the higher seepage rate is correct, the necessary release proposed by RRWSG would be only 0.5 mgd.

The City of Newport News supported their position by utilizing the Tennant Method classification system as outlined in the Tables 4 and 5 below.

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Table 4 - RRWSG's Proposed King William Reservoir Release Schedule
Normal Reservoir Pool Conditions (When Available KWR-IV >=80%)

Month	Controlled Release (mgd)	Dam Seepage (mgd)	<u>Effective Release</u>		<u>Tennant Classification</u>	
			mgd	% of mean Flow	Low Flow Months	High Flow Months
January	2.4	0.5	2.9	51		Excellent+
February	2.8	0.5	3.3	58		Outstanding-
March	3.0	0.5	3.5	61		Outstanding+
April	3.0	0.5	3.5	61		Outstanding+
May	2.3	0.5	2.8	49		Excellent-
June	1.5	0.5	2.0	35	xcel to Outstand	
July	1.5	0.5	2.0	35	xcel to Outstand	
August	1.3	0.5	1.8	32	Excellent+	
September	1.2	0.5	1.7	30	Excellent	
October	1.3	0.5	1.8	32	Excellent+	
November	1.4	0.5	1.9	33	xcell to Outstand	
December	2.4	0.5	2.9	51		Excellent+

Table 5 - Drawdown Reservoir Pool Conditions
(When Available KWR-IV Volume < 80%)

Month	Controlled Release (mgd)	Dam Seepage (mgd)	<u>Effective Release</u>		<u>Tennant Classification</u>	
			mgd	% of mean Flow	Low Flow Months	High Flow Months
January	1.2	0.5	1.7	30		Fair
February	1.4	0.5	1.9	33		Fair-Good
March	1.5	0.5	2.0	35		Fair-Good
April	1.5	0.5	2.0	35		Fair-Good
May	1.2	0.5	1.7	30		Fair
June	0.7	0.5	1.2	21	Good+	
July	0.7	0.5	1.2	21	Good+	
August	0.6	0.5	1.1	19	Good –	
September	0.6	0.5	1.1	19	Good –	
October	0.7	0.5	1.2	21	Good +	
November	0.7	0.5	1.2	21	Good +	
December	1.2	0.5	1.7	30		Fair

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Unfortunately, the RRWSG's interpretation of the percent flows from the Cohoke Creek release do not correspond to the flow regimes outlined by Tennant and the rationale for the use of above 80 percent and below 80 percent of the volume of the reservoir has not been fully explained. The District is reluctant to base downstream releases on the amount of water in the reservoir but would rather relate downstream releases to the actual flow regime of Cohoke Creek or its surrogate.

Table 6 - Instream Flow Regimes for Fish, Wildlife, Recreation, and Related Environmental Resources based on Tennant (1975)
Recommended Base Flow Regimens % of Mean Annual Flow (MAF)

Narrative Description of Flows	October - March	April - September
Flushing Flow	200%	200%
Optimum Range	60-100%	60-100%
Outstanding	40%	60%
Excellent	30%	50%
Good	20%	40%
Fair	10%	30%
Poor to Minimum	10%	10%
Severe Degradation	0-10%	0-10%

The City of Newport News identified low flow months from June to November and high flow months from December to May while Tennant utilizes April to September and October to March as its basis of evaluation. The Virginia State Water Control Board (VSWCB) Minimum In Stream Flow Study (1986) recognized the Tennant Method as a viable tool in the development of flow assessments for aquatic habitat. This study, however, cautions that although the Tennant Method is not a true desktop method, it is frequently used with no additional field assessment. Table 2-2 of the report is shown above which specifically outlines the base flow regimes of the Tennant Method. VSWCB (1986) further states that much of the early research used to develop the method was conducted on eastern streams and that rivers flowing in physiographic provinces with characteristics similar to Virginia were included in the information base on which the method was founded. The VSWCB Minimum Instream Flow Study acknowledged that it would be appropriate to specifically match flow recommendations to the critical periods in the life history of fishes present in the stream and cautioned against merely dividing the year into two 6 month periods that correspond to the wetter and dryer halves of the year because the critical biological periods do not necessarily coincide with the high or low flow periods in the Commonwealth of Virginia.

Specific concern was raised by the federal and state agencies over the blueback herring migration patterns in Cohoke Creek. The VSWCB report outlines the period of April to May for adult upstream migration, May to June for adult downstream migration, and June to October for juvenile downstream migration. For the non-tidal areas above the millpond dam, the species identified include bluegill, largemouth bass, shiner, and dace (FEIS, Table 4-45B). The VSWCB study identifies the spawning periods of the species as follows:

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<u>Species</u>	<u>Spawning Period</u>
Bluegill	May-August
Largemouth Bass	April-June
Shiner	May-July
Blacknose Dace	May-June

In order to assess the fishery-related needs of the Cohoke Creek basin, it would be most appropriate to utilize a flow period of April to October and November to March as the basis of a Tennant Methodology review. Under this scenario, the proposed releases by the RRWSG would result in a classification of Excellent to Outstanding from November to March and Fair to Outstanding from April to October under the 80 percent reservoir volume. Under the less than 80 percent reservoir volume, the classification changes result in a good to excellent rating from November to March and a Poor to Minimal ranking for most of the April to October period. I have determined that this period is critical for anadromous fisheries below the Cohoke Millpond dam; therefore, consideration of higher flows must be undertaken.

Table 7 - Modified Tennant Rating for Proposed Cohoke Creek releases utilizing the District's Revised Flow Regime, RRWSG Data and Tennant Ratings

Month	% of mean flow at ≥ 80% Volume	Tennant Rating		% of Mean flow at < 80% Volume	Tennant Rating	
		High Flow Month	Low Flow Month		High Flow Month	Low Flow Month
January	51	Outstand.		30	Excellent	
February	58	Outstand.		33	Excellent	
March	61	Optimal		35	Excellent	
April	61		Outstand.	35		Fair
May	49		Good	30		Fair
June	35		Fair	21		Poor/ Minimal
July	35		Fair	21		Poor/ Minimal
August	32		Fair	19		Poor/ Minimal
September	30		Fair	19		Poor/ Minimal
October	32		Fair	21		Poor/ Minimal
November	33	Excellent		21	Good	
December	51	Outstand.		30	Excellent	

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Concern has also been raised regarding the lower flow levels to the existing Cohoke Millpond. The proposed King William Reservoir dam would affect roughly half of the Cohoke Creek watershed and would reduce the volume of water entering the Millpond by approximately two thirds using the RRWSG's proposed flowby. This in turn would reduce the flow over the spillway from approximately 3,500 gallons of water per minute to approximately 1,200 gallons per minute under normal conditions. This raises additional concern over potential salinity changes in the Pamunkey River due to this reduction in freshwater input to the tidal portion of Cohoke Creek.

As there was no gauge in place on Cohoke Creek at that time, DEQ recommended that the RRWSG utilize a surrogate gauge in order to mimic the conditions at Cohoke Creek. During a meeting with DEQ, the RRWSG was given an option of three potential surrogate gauges including Totopotomy Creek, Cat Point Creek, and Piscataway Creek. Totopotomy Creek has the lowest mean annual flow per square mile of drainage which would tend to show any potential downstream releases in the most favorable light, reflect a higher percentage of the mean annual flow, and rate higher on the Tennant Method scale. The use of Totopotomy Creek may, therefore, not be the appropriate surrogate to measure downstream impacts at Cohoke Creek.

The Virginia Department of Environmental Quality review of the RRWSG's revised flow-by plan identified many of these discrepancies. Their 14 April 1998 letter discussed the misinterpretation of the Tennant figures which results in a lower rating than specified by Newport News in their January 1998 revised flow-by proposal. DEQ assumed that the applicant would do everything possible to eliminate seepage, and then in the interest of dam safety, install a toe drain to collect whatever water did get through the dam. DEQ recommended that the Norfolk District consider requiring a specified flow in Cohoke Creek immediately below the dam. This would take seepage into account and also require releases to accurately reflect the pre-construction flow regime. The conclusion of DEQ was that requiring higher downstream releases would be appropriate in order to minimize downstream impacts, protect existing in-stream uses, and comply with State Water Control Law.

The federal advisory agencies also expressed concerns regarding the acceptable minimum flow-by requirements for Cohoke Creek. In a 14 April 1997 letter to DEQ, the U.S. Fish and Wildlife Service expressed concern over the quality and quantity of water released into the downstream Cohoke Millpond. They recommended a more variable year round release which mimics the natural variation in the hydrograph (flood flows, normal high flows, low flows) in order to protect over 100 acres of wetlands below the dam that would be affected by alteration of quantity, duration, and seasonality of the flows. This position was echoed in the Service's letter to the Norfolk District, dated 25 July 1997. The Service recommended that if the applicant intended to replicate natural variability, that they examine monthly flow durations and the seasonality, duration, and magnitude of annual and infrequent pulses.

In a letter to the District dated 18 July 1997, the Virginia Department of Conservation and Recreation (DCR) also questioned the proposed KWR-IV dam release scenario as it would not mimic the natural Cohoke Creek streamflows due to the limited amount of water which would be released from the reservoir. They recommended that the project mimic the pre-project flows since the wetlands downstream of the dam and the fisheries would likely be affected by any changes in the hydrologic cycle. DCR recommended that Cohoke Creek be monitored and that any releases from the reservoir follow the natural hydrograph established through the sampling protocols.

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A meeting of the federal and state advisory agencies and representatives of the RRWSG was held on 1 October 1998. This meeting was scheduled to discuss the differences between the current RRWSG proposal and the natural flow release requested by the federal agencies. VDGIF discussed the rationale for the median monthly flow condition incorporated into the DEQ permit in order to balance the in-stream and off-stream uses. Consideration was given to habitat, assimilation capacity, and navigation issues related to the stream. The flow requirements necessary for sustaining aquatic life depend on both the size of the stream and the depth. The larger the stream, the lower the percentage of the average annual flow there is needed to sustain aquatic life. The 20 percent mean annual flow was initially considered but determined by DGIF to be unrealistic based on the downstream characteristics. The RRWSG produced a revised proposal which took into account an additional 0.5 MGD seepage loss from the dam to supplement flows to Cohoke Creek. The U. S. Fish and Wildlife Service reiterated their concerns and again recommended a natural flow scheme where inflow equals outflow, subject to a range of acceptable variation in order to capture both the low flow and high flow events within the waterway. This would allow RRWSG to maintain the hydrology of the beaver dams and protect the wetlands downstream of the proposed dam site. A suggestion was made to place a gauge in Cohoke Creek immediately so that data could be collected to refine the flows.

By letter dated 30 March 1999, the RRWSG presented a revised downstream release flow proposal. The revised plan would provide the estimated flow at dam site KWR-IV if the reservoir were not present or the estimated median monthly flow required by the DEQ permit if the estimated natural flow were greater than the median monthly flow. Although this proposal would more closely mimic the stream under low flow conditions, it does not allow for the short-term, high flow conditions represented by a rainfall or runoff event. I believe this high flow period contributes to maintaining the downstream aquatic resources.

A meeting of the federal and state advisory agencies was held on 15 May 1999 to discuss the flow-by alternatives presented by the RRWSG. The group reached consensus that the latest proposal by the RRWSG would not be acceptable as it would continue to discount high flow events which may be critical to sustaining downstream aquatic resources. The group also questioned the varying seepage figures presented by the RRWSG and determined that any solution would need a refined figure on seepage from the dam and options available to the RRWSG to control such water loss. The group also felt that a time series analysis would need to be performed to determine when the 80 percent water level in the reservoir would be contravened. The median monthly flows were determined to be less reliable because they masked the high and low flow conditions which may be critical to the downstream resources. Several suggestions were made on methods to protect the high flow events including peak flows to flush the waterway and mimic natural high flow events and the utilization of Totopotomoy Creek flows associated with precipitation data in the vicinity of the reservoir.

The RRWSG proposal focuses on the protection of downstream fisheries. In utilizing the modified Tennant Method, the RRWSG assumes that fisheries resources take precedence over other stream resources. As stated in comments by both the U.S. Fish and Wildlife Service and the U.S. Environmental Protection Agency, there are significant wetland resources downstream of the proposed KWR-IV dam site. The aquatic resources below the proposed dam are driven by supporting hydrology from the millpond, beaver activity and the remainder of the watershed. I believe that mimicking the natural flow regime is an important consideration in determining the flow-by requirements to sustain these areas.

To provide a methodology for mimicking the natural flow regime that could be incorporated into the design plan, there must be an acceptable range that could be met by the RRWSG. The group determined

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that a 10 percent variation would be appropriate. The group also determined that the measurement time must be small enough to capture the flow differences, yet long enough to be practical. Since the effort is based on a need for the high flows, a 3-day running average was suggested which would capture the high flows and would not mask these flows to a great extent. The daily range would be within 15 percent of this average while the monthly average would be within 10 percent of the established flow. In addition, the group determined that the high flow matches would be waived should the RRWSG implement a mandatory water restriction for their customers. The longer monitoring can be performed in Cohoke Creek, the easier it will be to establish a unit hydrograph for the watershed. The use of Totopotomy Creek as a surrogate was discussed by the group. Since Totopotomy Creek represents a much higher drainage basin, the group concurred that it would be preferable to establish an adjacent watershed as the surrogate. It would be much more likely that events in an adjacent watershed would more closely mirror conditions in Cohoke Creek. Through the establishment of baseline conditions for both rainfall and runoff in both waterways, it would be appropriate to develop a hydrograph that would reflect natural conditions prior to dam construction.

The RRWSG supplied their analysis of the proposed discharges with respect to Section 404 (b)(1) of the Clean Water Act in November 2000. In their analysis, they state that the conditions imposed by the Virginia Water Protection Permit are equal to the median monthly flows of Cohoke Creek at the dam site along with the hydrologic influence of the reservoir and would effectively eliminate any potential dewatering of the downstream wetlands. The revised RRWSG plan discussed above would provide a more natural flow regime; however it still neglects to take into account the high and low flow regimes that both the Virginia Department of Game and Inland Fisheries and the U.S. Fish and Wildlife Service have identified as being critical to the ecological health of the downstream resources. The RRWSG also proposes to incorporate a multilevel release to protect downstream water quality. Although this condition would aid in the protection of water quality, the District and the advisory agencies continue to emphasize that the volume of water released to the downstream system is vital to maintenance of the wetland ecosystem downstream of the King William reservoir. Ideally, the downstream releases would mimic natural conditions. The most recent proposal by the RRWSG continues to emphasize a set flow rather than the fluctuating flows requested by the District and other federal and state advisory agencies.

In conclusion, I recommend that downstream releases be based on the natural flow regime of Cohoke Creek. The District staff has determined that the information collected at the Cohoke Creek gauge currently being monitored by the RRWSG and the collection of rainfall data in the vicinity of the proposed reservoir would be required in order to establish the downstream releases. The District could then develop a unit hydrograph which is based on precipitation that falls on the basin and then establish a simple model to determine stormflow hydrographs. This data would also aid the District in a final determination of the adequacy of utilizing Totopotomy Creek as a surrogate for flows in Cohoke Creek. It would also allow the District and the Virginia Department of Environmental Quality to develop a flow regime which would approach the natural variation currently found in Cohoke Creek while minimizing the impact to the reservoir. The methodology would include a 3-day running average to capture the high flows, a daily range within 15 percent of this average and a monthly average within 10 percent of the established flow criteria. The high flow matches would be waived should the RRWSG implement a mandatory water restriction for their customers. (For a detailed discussion of this issue, see the District's "Assessment of Proposed Cohoke Creek Flow-by Requirements for the King William Reservoir Project.")

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(4) King William Reservoir Watershed: In December 1996, a citizen group opposing the reservoir project reported to EPA that before it was closed in April 1995, the 85-acre King William Landfill (#505) had received several loads of pulp waste from the Chesapeake Corporation paper processing plant. Landfill #505 is located within the watershed of the proposed King William Reservoir at the intersection of Route 30 and Route 640 in King William County. Because bleached pulp waste is known to contain dioxin, EPA's Region III Emergency Response Center performed sampling to determine if any imminent and substantial threat to public health, welfare or the environment existed from potential dioxin contamination at landfill #505 and to determine if a removal action was necessary. EPA collected and tested a total of six water samples from monitoring wells and leachate tanks on 24 January 1997.

A monitoring well system is located around the perimeter of the landfill and routine sampling has demonstrated compliance with the landfill permit and all Virginia Solid Waste Management regulations. Also, EPA was informed that all wastes deposited in landfill #505 by the Chesapeake Corporation met the criteria of an approved non-hazardous waste and that all bleached paper products generated within the pulp and paper operation are recycled back into the pulp and would not have been included in the material deposited at the King William landfill.

Although the most toxic 2,3,7,8-tetra chlorinated dibenzo-p-dioxin (2378-TCDD) was not detected, 4 of the 6 locations showed parts per quadrillion levels of octachlorinated dibenzo-p-dioxin (OCDD), the least toxic isomer of dioxin. EPA determined that the concentrations found do not require a removal action and the risk associated with the current levels of OCDD do not approach any levels of concern for drinking water from the King William Reservoir, should it be built.

Despite EPA's determination that landfill #505 poses no concern for dioxin, on 20 June 1997 the Institute for Public Representation, on behalf of the Mattaponi Tribe, requested that EPA investigate more fully the potential impact of dioxin hazards on the King William Reservoir project and the Mattaponi Tribe. In response to this request, EPA Region III's Resource Conservation and Recovery Act program sampled all of the wells in the groundwater monitoring network around landfill #505 on 24 and 25 February 1998. The results of the sampling confirmed the earlier conclusion that dioxin is not a problem at the landfill or for the proposed King William Reservoir.

The final landfill cap is expected to limit surface water infiltration and minimize leachate generation. Since the groundwater table aquifer is thought to flow in a southwesterly direction toward Cohoke Creek, any leachate leaving the landfill should flow towards the reservoir. State regulations require water quality monitoring both during operation and after closure of landfills. Should it become necessary, the RRWSG has proposed a number of corrective actions to prevent any leachate-contaminated groundwater from reaching the reservoir. Among these methods are: the construction of a slurry wall, groundwater interceptor ditches and buried drains, groundwater recovery wells and rerouting of surface drainage away from the reservoir, and full removal of the disposed materials.

In January 1999, as a part of the evaluation of potential dioxin contamination, EPA contracted with the Corps of Engineers Philadelphia District to develop a 2-dimensional groundwater model to assess the potential effects of the construction of the proposed reservoir on groundwater flow near the landfill. The hydraulic divide was previously assumed to be coincident with Route 30. However, based on a review of historical water level data for that landfill, the modeling results show that due to the flat topography in the area, the hydraulic divide may currently move back and forth beneath the landfill with seasonal variations

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in precipitation and recharge. In the model, the presence of the proposed reservoir could move the hydraulic divide westward by as much as 200 feet.

Therefore, it is anticipated that there may be an alteration of the existing groundwater flow patterns (along with an increase in lateral seepage out of the reservoir) due to the rise in water table elevation in the Cohoke Creek watershed as a result of the proposed reservoir. Groundwater recharge is expected to increase in the vicinity of the reservoir. However, based on their sampling, EPA has determined that dioxin does not pose a problem to groundwater quality surrounding the landfill or to water quality within the King William Reservoir, should it be built.

In their 25 July 1997 letter, EPA recommended that the Corps require groundwater quality monitoring and mitigation, specifically for dioxin, to ensure that the landfill does not impact the water quality of the reservoir or endanger groundwater wells in the area. DEQ has since determined that the current landfill monitoring system is adequate as it has both upslope and downslope wells that monitor groundwater quality surrounding the landfill. Based on DEQ's findings, EPA no longer recommends that the District require additional monitoring wells.

f. Fish and Wildlife Resources:

(1) Habitat Description:

(a) Cohoke Creek System: Cohoke Creek is a low-gradient stream system that lies in a deeply incised valley between the Mattaponi and Pamunkey Rivers. The Cohoke Creek watershed includes a diverse wetland complex, mature and immature forests, free-flowing streams and beaver ponds. The 1,526 acres of wetland and upland system that would be impacted by the King William Reservoir (KWR-IV) consists of 114 acres of coniferous forest, 618 acres of mixed coniferous/deciduous forest, 87 acres of mature cove hardwood forest, 270 acres of early successional logged forest, and 403 acres of vegetated wetlands, 34 acres of shallow open water communities, and 21 miles of perennial and intermittent streams which comprise 64 different cover types and hydrologic regimes.

The project area is generally undisturbed except for silvicultural activity. Although heavily logged in some areas, the site contains large expanses of wetland and upland forests. These upland and wetland communities provide valuable and diverse habitat for fish and wildlife and support a wide variety of aquatic, semi-aquatic and terrestrial species. The functions and ecological value of these communities are enhanced by their juxtaposition and interspersions. For instance, the large diameter trees and snags in the mature forests provide habitat for cavity nesters such as the barred owl and pileated woodpecker, and the surrounding contiguous forests provide sufficient expanse for their home ranges.

The diverse wetland complex at the site accounts for over thirty of the cover types and hydrologic regimes present and is a mixture of palustrine forested, scrub-shrub and emergent wetlands. Typical species found in non-tidal forested wetlands at the proposed reservoir site include red maple (*Acer rubrum*), smooth alder (*Alnus serrulata*), bayberry (*Myrica cerifera*), sycamore (*Platanus occidentalis*), river birch (*Betula nigra*), and silky dogwood (*Cornus amomum*). Dominant species in palustrine forested/scrub-shrub wetlands include smooth alder, bayberry, silky dogwood, and buttonbush (*Cephalanthus occidentalis*). Dominant species in palustrine emergent wetland at the site include sedges (*Carex* spp.), soft rush (*Juncus effusus*), arrow arum (*Peltandra virginica*), sensitive fern (*Onoclea sensibilis*), switch grass (*Panicum virgatum*), smartweed (*Polygonum* spp.), pickerelweed (*Pontederia*

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cordata), woolgrass (*Scirpus cyperinus*), bulrush (*Scirpus* spp.), marsh fern (*Thelypteris palustris*), and broad-leaved cattail (*Typha latifolia*). Cove hardwood forests are older deciduous forests typically found at the heads of ravines and on slopes in the stream valleys and are composed mainly of beech (*Fagus grandifolia*), oak (*Quercus* spp.) and hickory (*Carya* spp.). These types of communities are rare in logged areas and provide extremely high quality wildlife habitat. Due to their age and landscape position, these communities are very difficult to replace or re-create. Rather than showing low aquatic diversity and abundance functions as claimed by the City of Newport News, the various wetland diversity analyses indicated that the proposed impoundment area of Cohoke Creek includes a structurally complex and diverse wetland system providing multiple valuable ecological functions.

(b) Mattaponi River System: The Mattaponi River joins the Pamunkey River at the town of West Point to form the York River. The Mattaponi River supports extensive and diverse riparian wetland communities classified as tidal freshwater (0.0 to 0.5 ppt) at the headwaters to oligohaline (0.5 to 5.0 ppt) at the mouth. These tidal freshwater wetlands provide habitat for rare plant species and migratory waterfowl, support an important shad fishery and serve to protect water quality in the Chesapeake Bay. An extensive tidal freshwater marsh known as Garnetts Creek Marsh is located on the North shore of the Mattaponi River directly across from the proposed intake site. Typical herbaceous species found in the marsh include pickerelweed (*Pontederia cordata*), arrow arum (*Peltandra virginica*), spatterdock (*Nuphar luteum*), wild rice (*Zizania aquatica*), smartweed (*Polygonum* spp.), tearthumb (*Polygonum arifolium* and *P. sagittatum*), rice cutgrass (*Leersia oryzoides*) and Walter's millet (*Echinochloa walteri*). A small tidal freshwater marsh is located about 600 feet upstream of the intake site on the southern side of the river. This small "pocket" marsh is dominated by sweet flag (*Acorus calamus*), pickerelweed, arrow arum and spatterdock. Colonies of sensitive joint-vetch (*Aeschynomene virginica*), a federally listed threatened plant species, are also found in these two marshes.

The Virginia Department of Conservation and Recreation stated that "The Mattaponi River is one of the most significant natural habitats in the eastern United States." They further commented that the Mattaponi River supports state-significant and exemplary freshwater tidal marshes and swamps and provides important habitat for rare species such as the sensitive joint-vetch and the bald eagle.

(2) Ecological Impacts of the Proposed Work:

(a) Habitat Loss: The project would result in the conversion of 1,526 acres of a highly diverse and productive system of wetlands, forests and streams and their wildlife communities into a far less diverse, open-water lake environment favored by relatively few species. Construction of the reservoir would inundate at least 21 miles of stream channel, 34 acres of open water habitat, 403 acres of vegetated non-tidal wetlands, 875 acres of forested uplands, and 214 acres of early successional forested uplands. The existing wetlands would be displaced by the fill material for the dam or inundated by backflooding. The Norfolk District recognizes that all of the wetlands would not be lost due to fill impacts. However, the functions and values of the existing vegetated wetland complex would be removed.

Restriction of flows from construction of the proposed King William Reservoir dam also has the potential to alter the sustaining hydrologic regime and associated biogeochemical processes of existing non-tidal wetlands located downstream of the proposed reservoir site. Additionally, construction of pipelines to connect the new reservoir to the existing Newport News Waterworks distribution system and provide for the proposed pumpover from the Mattaponi River would result in the permanent conversion of forested

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wetlands to emergent and/or scrub-shrub wetland cover types. A breakdown of these impacts by cover type for the proposed King William Reservoir (KWR-IV) pool area only is shown below:

34 ACRES VEGETATED WATERS

Open Water 34 acres

403 ACRES VEGETATED WETLAND

Palustrine Emergent 37 acres

Palustrine Emergent/Open Water 18 acres

Palustrine Scrub-Shrub 13 acres

Palustrine Scrub-Shrub/Emergent 63 acres

Palustrine Scrub-Shrub/Open Water 2 acres

Palustrine Forested 192 acres

Palustrine Forested/Emergent 40 acres

Palustrine Forested/Scrub-Shrub 32 acres

Palustrine Forested/Scrub-Shrub/Emergent 5 acres

Palustrine Forested/Open Water 1 acre

1089 ACRES UPLAND

Mixed Forest 618 acres

Cove Hardwood 87 acres

Early Successional Logged Area 270 acres

Evergreen Forest 114 acres

TOTAL ACREAGE 1526 acres

(SOURCE: Table 2-1, King William Reservoir Project, Habitat Evaluation Procedures, Main Report (Malcolm Pirnie, 1999a))

It is important to note that the currently proposed King William Reservoir would effectively eliminate the entirety of the upper Cohoke Creek headwaters (both vegetated wetlands and unvegetated streams above the dam) as well as a large portion of the mainstem of Cohoke Creek proper and its associated wetlands. Immediately after construction of the reservoir, there would be an artificial system comprised of a large open water body devoid of any upslope natural bordering wetlands.

The City of Newport News has continued to assert that construction of the King William Reservoir would have little if any adverse impact and claims that any impacts that are realized, such as wetland loss, would be easily mitigated and most likely offset by the enormous gain in open water created by the reservoir. The City asserts that the reservoir would not represent a true loss of habitat, but rather only the conversion of habitats; and that the 1,500-acre lake and its 77 miles of shoreline would provide larger and more productive fish and wildlife habitat and better water quality than the natural upland forests, wetlands and streams. They claim that rather than being monotypic, the reservoir itself would provide 1,251 acres of deepwater habitat and 322 acres of shoreline and shallow water habitat for spawning, nursery, nesting, migratory and wintering areas that would be used by waterfowl, wading birds, amphibians and other aquatic organisms. The City expects 200 acres of wetland fringe to develop around the reservoir; and expects that when mature, the upland buffer area around the reservoir would provide greater wildlife habitat than the upland areas impacted by the reservoir. The City also alleges that the existing low dam at

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Cohoke Millpond already precludes interaction between the Cohoke Creek watershed and the larger Chesapeake Bay ecosystem.

EPA commented that the loss of such a large area of contiguous forest would represent a serious threat to habitat (especially for area-sensitive species) and biodiversity in the area as well as a dramatic alteration of a functioning stream valley ecosystem in the Chesapeake Bay watershed. EPA contends that waterfowl, forest interior bird species and raptors such as the bald eagle presently traverse the existing low dam and utilize the large, uninterrupted tracts of bottomland hardwood and other forested land for migration, feeding and breeding. Impounding Cohoke Creek would eliminate the varied topography and reduce the existing diversity of interspersed habitats. Consequently, the food, cover and reproductive sites for the vast majority of species in the reservoir pool area would disappear. The loss of the natural hydrologic regime would dramatically alter patterns of sediment transport and fish passage, and reduce the exchange and transport of nutrients, detritus and organisms between the channel and the floodplain both above and below the proposed dam. The establishment of a stocked freshwater fishery would not compensate for the impacts of the project to resident fisheries as asserted by the RRWSG. It is also unlikely that the created deep-water habitat would be more valuable than the existing wetlands as claimed by the RRWSG.

In a letter dated 5 August 1999, EPA stated their belief that the uniqueness/heritage values of the wetland ecosystem that would be lost would not be sufficiently replaced by the open water habitat of a man-made lake. Many of the forested systems, especially bottomland hardwoods and mature cove hardwood areas, have a productivity rate and biological diversity that is well above that of a managed man-made lake. Due to the age and landscape position of the mature cove hardwood areas, the U.S. Fish and Wildlife Service believes they would be extremely difficult to replace or re-create. Although man-made lake environments may be productive at first, the agencies indicated that productivity declines over time. Also, the entire surface of the reservoir would not represent usable habitat as asserted by the RRWSG. While some portion of the surface of the deep-water lake would be utilized by fish or wading birds, it is the shallow water littoral fringes that would be most valuable to fish and other wildlife for breeding and nursery habitat and for cover and foraging. However, water level fluctuations and periodic drawdowns associated with reservoir operation would decrease the habitat value and use of the littoral zone and fringe wetlands by wildlife. EPA stated that "EPA continues to believe it is inappropriate to view these losses as offset by gain in open water habitat as discussed in the May 1999 Plan."

The City of Newport News has stated that the reservoir will remain within one foot of its normal pool elevation for more than 80 percent of the time during its first 30 years and they believe the wetland fringe will be as stable as those at their other reservoirs. However, the proposed King William Reservoir would be at the top of the system and it would have steep slopes down to the waters edge. In addition, Malcolm Pirnie predicted the water elevations would decrease by 10 feet for periods of time and by as much as 25 feet, 40 years after construction. The widely fluctuating water levels, especially in later years of reservoir operations when water demand would be higher, make the sustainability of the fringe wetlands questionable. The duration of drawdown and the time of year are critical, and the advisory agencies believe that the fringe would likely be very small or nonfunctional for a substantial part of the 50-year project evaluation period. The drawdown time was considered one of the greatest limiting factors.

The Norfolk District does not dispute that some vegetated wetland fringe would likely develop along the shoreline of the new proposed reservoir. However, the methods proposed to quantify this area are questionable, the water level fluctuations from future projected use of the King William Reservoir would

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limit the long-term viability of any vegetated wetland fringe, and such a vegetated wetland fringe would provide relatively few functions in comparison to the existing Cohoke Creek wetlands (i.e., fringe wetlands would be out-of-kind). Although focusing on estuarine wetlands, Childers and Day, in a 1991 paper entitled “The Dilution and Loss of Wetland Function Associated With Conversion to Open Water,” present a compelling argument that conversion of a predominantly vegetated wetland system to a more open water system decreases the wetland to open water ratio and effectively dilutes the functions of the remaining wetlands relative to the aquatic system. Childers and Day postulate that in such a scenario “although wetland area would remain, it would be diluted so effectively... that, in an ecological sense, it would be functionally lost to the system.” The proposed King William Reservoir would effectively result in the complete loss (inundation) of all wetlands situated upstream of the dam, and any new fringe wetlands that might develop around the reservoir would not be associated with other natural non-tidal wetlands. This would result in a very artificial, functionally depauperate and isolated system in the upper watershed of Cohoke Creek. Any fringe wetlands that might develop would be very narrow in width, and arguably the only viable wetland function they would serve would be as habitat. The habitat provided by the shallow water areas of the proposed King William Reservoir and adjoining vegetated buffer have been quantified and credited by the District’s Habitat Evaluation Procedures (HEP) study, and are responsible for most of the habitat credit gains for several of the species evaluated in the study (e.g., beaver, mink, great blue heron, and red-spotted newt).

Furthermore, the U.S. Fish and Wildlife Service expressed concern that planned development and recreational activities in and around the reservoir would discourage its use by wildlife. According to the 1997 King William County Comprehensive Plan, the area immediately adjacent to the reservoir would be designated as a Resource Protection Area in accordance with the Chesapeake Bay Preservation Act. This would be a 100-foot wide buffer zone around the reservoir in which no buildings, land disturbance activities or clearing would be allowed. The remainder of the watershed is designated as a Watershed Protection Area which is also in the County’s Resource Management Area. The RRWSG stated in the FEIS that there would be minimal planned development around the reservoir. However, the 1997 King William County Comprehensive Plan indicates “Moderate residential development is intended within the Watershed Protection Area and at its periphery a narrow area is designated for moderate mixed development of residential, light commercial and planned unit development.” Human disturbances from such development would change the rural and agricultural setting of the area, further reduce the habitat available to wildlife and reduce the habitat value of the proposed buffer zone surrounding the reservoir.

Also, public recreational access to the reservoir and surrounding land would significantly decrease habitat value and use by wildlife. The County’s recreational plan includes nature trails and picnic areas within the buffer surrounding the reservoir. The presence of picnickers, dogs, bicyclists, motorized bikes and other disturbances in the buffer area would render it of limited habitat value compared to its existing condition and would significantly decrease the quality of habitat for those species less tolerant of human activities.

The project would result in the alteration and potential degradation of 186 acres of wetlands and the wildlife habitat they provide downstream of the proposed dam, as well as 0.8 miles of streambed below the proposed discharge point on Beaverdam Creek. Although the actual physical disturbance to wetlands along the pipeline route would be temporary, the wetlands would be permanently converted. Maintenance of the right-of-way would change the palustrine forest community to an emergent and/or scrub-shrub system and would result in habitat fragmentation. Furthermore, these disturbed areas may become dominated by more tolerant exotic and invasive species such as *Phragmites australis* (common

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reed), the establishment of which would further degrade the wildlife habitat. The U. S. Fish and Wildlife Service commented that forested wetlands provide especially valuable habitat for certain forest-dependent songbirds and some of the species most dependent on moist woods are the most susceptible to forest fragmentation.

(b) Wetland Loss: When the project was originally presented to the Norfolk District and the federal agencies in the December 1989 "Preliminary Report on Aquatic Resource Issues" and further documented in the applicant's June 1993 "Alternatives Assessment", the RRWSG reported that 293 acres of wetlands would be impacted by the reservoir at the original dam location (KWR-I). By the time the application was submitted on 6 July 1993, the applicant's environmental consultants had performed a more thorough review and reported that 479 acres would be impacted. However, a detailed wetland delineation of the King William site conducted jointly by environmental consultants working for Newport News Waterworks and James City County in May 1994, revealed that the reservoir would impact approximately 653 acres of wetlands at 90 feet mean sea level. In the first revised permit application submitted on 14 June 1995, the dam was relocated 2,900 feet upstream of the originally proposed dam location and the normal pool elevation was raised by 6 feet. With this configuration, the wetland impacts were reduced to 574 acres (KWR-II) at 96 feet mean sea level. A second revised permit application was submitted on 30 December 1996 for a dam at a location 9,700 feet upstream of the originally proposed dam location which reduced the impacts to 403 acres of vegetated wetlands and 34 acres of shallow open water habitat (KWR-IV).

The City of Newport News has included 186 acres of the wetlands and 620 acres of uplands downstream of KWR-IV as a temporary preservation component of their mitigation plan until such time as they enlarge the reservoir footprint back to either the KWR-II or KWR-I location. A clause in the City of Newport News' Development Agreement with King William County reserves the wetlands between the KWR-IV and KWR-II dam sites for future downstream enlargement of the reservoir. If it were ever permitted, such an enlargement would impact a total of 574 to 653 acres of wetlands for the King William Reservoir. These downstream wetlands closely resemble those in the proposed impoundment area and possess a high level of ecosystem diversity.

The King William Reservoir (KWR-IV) would inundate 52 percent of the Cohoke Creek watershed and virtually all of the existing wetlands above the impoundment. The exceptions would be those wetlands on a small number of headwater streams and isolated wetlands above the normal pool elevation. As currently proposed, approximately 403 acres of non-tidal, palustrine forested, emergent and scrub-shrub wetlands and 34 acres of open water plus 21 miles of stream channel would be filled, excavated or inundated by the KWR-IV configuration.

The RRWSG has estimated 21 miles of stream corridor would be impacted by the proposed project. Approximately 12 miles are intermittent streams and 9 miles are perennial. The streams are further described as approximately 11.5 miles of intermittent and 3 miles of perennial first order streams; 0.4 miles of intermittent and 2.6 miles of perennial second order streams; and 3.5 miles of perennial third order streams. This breakdown was based on an analysis of the King William and King and Queen Courthouse U.S. Geological Survey quadrangle maps. A more accurate measurement of the linear footage to be impacted would need to be field determined in order to further develop a stream restoration plan. The area includes all streams that would be below the proposed reservoir's normal pool elevation of 96 feet above mean sea level.

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The RRWSG claims that the wetlands impacted in Cohoke Creek are not unique in any way. In a letter dated 27 November 2000 responding to comments on RRWSG's Environmental Issues Summary, the City of Newport News claimed that the existing Cohoke Creek wetlands are not unique because they comprise less than 4 percent of the total estimated non-tidal palustrine wetlands in King William County. As the quality and habitat value of the remaining wetlands and forests in King William County is unknown, no valid comparison with the impacted area can be made. Additionally, non-tidal palustrine wetlands can occur in a wide variety of landscape positions and encompass several hydrogeomorphic wetland classes. Therefore, the City's use of percentages is a mischaracterization of the relative abundance of the Cohoke Creek wetland types in the project vicinity. The District is more concerned with the actual predicted wetland loss associated with the project, rather than with expressions of relative loss of wetland type or acreage that tend to downplay the magnitude of the impacts to the aquatic environment. In their letter of 23 August 1996, the U.S. Fish and Wildlife Service stated that their field representatives found the site to be ecologically diverse and observed a variety of plant communities and hydrologic regimes within the proposed reservoir pool. The Service considers Cohoke Creek to be a unique resource within Virginia's lower peninsula. EPA reiterated this opinion in their letter of 28 May 1998 saying "These wetlands, interspersed among uplands, create a unique ecosystem complex with unique functions and values." Based on the Habitat Evaluation Procedure, as well as the two wetland diversity analyses employed by the applicant, I find these areas contain a diverse wetland complex providing multiple ecological functions and high quality wildlife habitat.

This diverse habitat includes beaver ponds, highly productive emergent wetlands, stream bottom and riparian wetlands as well as areas of mature forest. This low-gradient system serves an important role in maintaining water quality. The proposed King William Reservoir (KWR-IV) involves the largest single destruction of wetlands and their associated habitat ever evaluated in the Norfolk District and exceeds the annual wetland impacts authorized by the Norfolk District in the entire State of Virginia for 1996 (394.4 acres), 1997 (267.5 acres) and 1998 (266.4 acres). The next largest impact evaluated in the Norfolk District was James City County's proposed Ware Creek Reservoir, which in 1987 would have impacted 381 acres of wetlands and 44 acres of open water. (By 1994, more detailed mapping and further beaver activity increased the estimated impacts at Ware Creek to about 546 acres of wetlands and 44 acres of open water).

(i.) Impacts to Downstream Wetlands: The RRWSG claims there are 186 acres of non-tidal wetlands in the mainstem (associated headwater wetlands not included) of Cohoke Creek between the proposed KWR-IV dam site and the upper reaches of Cohoke Millpond. Concern for maintaining the existing hydrologic regime (and associated sediment/nutrient dynamics, etc.) for downstream wetlands has been raised by the District and the advisory agencies. These wetlands are supported in part by hydrologic input from above the proposed dam location and could change in character and/or be reduced in acreage by the almost two-thirds reduction in flow volume. In a letter dated 22 July 1999, the Service indicated their continued concern that the RRWSG's plan for downstream releases would not avoid impacts to the functioning of downstream wetlands. The RRWSG stated that their proposed reservoir releases would attempt to mimic the natural downstream flows in Cohoke Creek. Regardless of the release schedule implemented for the King William Reservoir, the mere fact that a dam would be placed across Cohoke Creek assures that the existing flow regime and associated processes (e.g., downstream sediment transport, channel-forming and channel-maintaining flooding events, timing and magnitude of flood flows, etc.) would be altered. The RRWSG's Mitigation Program, Fish and Wildlife Plan claims "the project will result in the added retention of approximately 590 tons of sediment per year." There is little doubt that the existing Cohoke Creek vegetated wetlands do perform a sediment retention function,

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but in such a sparsely developed watershed it is at an appropriate level that still allows sediment pulses to be regularly transferred to downstream wetlands. This downstream transport of sediment is not only normal, but is essential for the natural maintenance of a healthy riverine system according to Leopold, et al, in a 1964 publication, Fluvial Processes in Geomorphology; and in a 1995 paper entitled “Downstream Ecological Effects of Dams” by Ligon, *et al.*, as well as in Restoration of Aquatic Ecosystems by the National Research Council, (1992). The proposed dam would disrupt the existing balance between erosional and depositional rates for portions of Cohoke Creek proper located downstream of the project area and extending down-gradient at least to Cohoke Millpond. By depriving sediment inputs to downstream portions of Cohoke Creek, the proposed dam would detrimentally alter the processes responsible for maintaining the dimensions and dynamics of the existing Cohoke Creek channel and associated floodplain. Ligon *et al.* state “if a stream’s physical foundation is pulled out from under the biota, even the most insightful biological research program will fail to preserve ecosystem integrity.”

This is a perfect example of where an alteration (in this case construction of the King William Reservoir) that maximizes one or a few wetland functions can actually be detrimental to the overall environment.

The proposed KWR-IV would result in the impoundment of a large portion of the upper Cohoke Creek watershed, including headwater drainages, associated vegetated wetlands, and adjoining upland habitat. Eliminating these features would sever organic inputs and processing of detritus for much of the Cohoke system, especially for those wetlands associated with the mainstem of Cohoke Creek located downstream of KWR-IV and upstream of the Cohoke Millpond. Significant losses of small forested wetlands along low order streams, with their associated capacity to retain or transform water, sediment, and nutrient inputs, could influence both the quantity and quality of inputs to higher order streams, their associated floodplains, and ultimately downstream estuarine and marine ecosystems, as discussed in the papers entitled “Changes in the Functioning of Wetlands Along Environmental Gradients” by Brinson in 1993 and “Functions and Values of Forested Wetlands in the Southeastern United States” by Walbridge in 1993.

Although the continuity of headwater vegetated wetlands to freshwater tidal vegetated wetlands of Cohoke Creek is currently severed by the Cohoke Millpond, dissolved and particulate forms of organics and other nutrients originating in the Cohoke headwaters eventually contribute to the maintenance of downstream aquatic communities, especially during flood events. Fowler and Hershner studied aboveground primary production for a portion of tidal freshwater Cohoke Swamp located downstream of the Cohoke Millpond dam and in 1989 reported their results in a paper entitled “Primary Production in Cohoke Swamp, a Tidal Freshwater Wetland in Virginia.” Fowler and Hershner chose this system for study since it had “remained virtually undisturbed by timber harvesting practices and other human encroachment for nearly 200 years or more.” Their study concluded that in terms of productivity, the tidal freshwater Cohoke Swamp ranked among the most productive riverine swamp forests in the eastern United States. The degree to which the proposed King William Reservoir might impact the lower reaches of Cohoke Creek has not been determined.

The RRWSG has offered to place temporary conservation easements over 186 acres of stream corridor (this acreage does not include associated headwater wetlands) and 620 acres of adjoining upland habitat located downstream of the proposed King William Reservoir dam and upstream of the existing Cohoke Millpond dam. However, since the RRWSG has not agreed to preserve these areas in perpetuity, it raises the question of possible future impacts to this reach from related King William Reservoir activities. As noted earlier, a clause in the City of Newport News' Development Agreement with King William County

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reserves the wetlands between the KWR-IV and KWR-II dam sites for future downstream enlargement of the reservoir.

Considering the above, the King William Reservoir would impact additional wetlands other than those currently situated within the proposed reservoir pool area. This is contrary to the RRWSG's claim in the Final Wetland Mitigation Plan that "the inescapable conclusion...is that there is no realistic possibility for cumulative environmental degradation." The RRWSG continues to assert the environmental impacts of the project would be limited to the KWR-IV pool area. While the downstream impacts would be more subtle and more difficult to calculate than those inside the reservoir, I am convinced they would occur.

(ii.) Wetland Conversion Impacts: Installing the pipeline from the proposed King William Reservoir to the Diascund Reservoir would also impact wetlands. Approximately 10.4 acres of wetlands would be converted from forested wetlands to emergent and/or scrub-shrub wetlands. Although the affected area would still be vegetated wetlands if pre-disturbance contours are re-established, there would be a loss of forested wetland function associated with a change in cover type due to clearing and continued maintenance of the utility corridor. Evaluating these wetland conversion impacts as permanent wetland impacts is consistent with the Corps' current Nationwide Permit policy (NWP-12) for utility line projects with wetland cover type conversions in easements that will be continually maintained (Chief, Regulatory Branch, HQ-USACE, Draft "Nationwide Permit Questions and Answers", February 1997; Final Notice of Issuance and Modification of Nationwide Permits published in the Federal Register (Volume 65, Number 47 on 9 March 2000). Common reed (*Phragmites australis*) and other exotic species that thrive in disturbed areas may also re-vegetate the pipeline right-of-way and further reduce its habitat value. Also, approximately 0.15 acres of wetlands would be filled and excavated by the proposed outfall structure, riprap apron and discharge channel on Beaverdam Creek.

EPA commented that the impacts related to the loss of 437 acres of diverse and valuable wetlands/open water habitat within the Cohoke Creek basin would be significant. The wetlands of the Cohoke Creek site have been shown to be of high structural complexity and ecological value. Available literature on restoration of palustrine forested and scrub-shrub wetlands indicates that these types are among the most difficult to mitigate. If these impacts are not appropriately mitigated, EPA feels that the project may result in substantial and unacceptable impacts to Aquatic Resources of National Importance (ARNI). The U.S. Fish and Wildlife Service recommended denial of the proposed King William Reservoir because the project's impacts would be extremely detrimental to the fish and wildlife resources of Southeast Virginia and will result in substantial and unacceptable impacts to Aquatic Resources of National Importance.

The RRWSG stated their belief that these wetlands are not a good example of forested riparian systems in the Coastal Plain because of disturbance from silviculture and agriculture as well as from the Cohoke Millpond and beaver activity. They also disagree with the determinations by EPA and the Service that the wetlands in Cohoke Creek constitute an Aquatic Resource of National Importance (ARNI). EPA reiterated their position that the Cohoke Creek wetlands constituted an ARNI in the letter responding to the applicant's Environmental Issues Summary. In the 27 November 2000, letter responding to the comments from the EPA on the RRWSG's Environmental Issues Summary, Newport News stated, "The Cohoke Wetlands do not constitute a National Resource of Aquatic Importance." Newport News appears to have meant the term Aquatic Resource of National Importance. The designation of an ARNI is procedural, as it applies to EPA's ability to elevate a project under the "Section 404 (q) Memorandum of Agreement between the Environmental Protection Agency and The Department of the Army." The Department of Interior has a similar MOA with the Department of Army concerning the Service's ability

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to elevate a decision when they determine that the project may result in substantial and unacceptable impacts to Aquatic Resources of National Importance. If a signatory agency to this MOA asserts that a resource is an ARNI, it is up to the Assistant Secretary of the Army for Civil Works to agree or disagree with that assertion. Neither the Corps nor the applicant can make a determination of the presence or absence of an ARNI.

(c) Upland Loss: The Corps of Engineers does not have jurisdiction over the 1,089 acres of uplands that would be lost; therefore, mitigation for upland impacts is not required as a part of the public interest review. However, the uplands are an integral part of the wetland/upland ecosystem in the Cohoke Valley and would be both directly and indirectly affected by the proposed reservoir. Therefore, the impacts to upland areas were described in the EIS and their habitat value was evaluated along with the wetlands in the HEP analysis. The function of these uplands is enhanced by their juxtaposition and interspersions with the wetlands of Cohoke Creek. In addition to wildlife habitat, these uplands provide nutrient cycling, erosion control and groundwater recharge. The City of Newport News contends that the upland areas that will be affected "...do not represent a very high quality habitat..." and "...are not worthy of special consideration..." To illustrate their point they provided photographs of an area that was recently clear-cut. The Virginia Department of Conservation and Recreation Division of Natural Heritage commented that the existing silvicultural activities have not resulted in poor quality habitat as alleged by the applicant. Approximately 214 acres of the upland habitat has been impacted by logging activity. In the silvicultural management of the area, sections are cut and allowed to re-grow on a rotational basis. The new growth in recently cut areas provide early successional habitat that also has wildlife value. Furthermore, the mature forest patches still present within the Cohoke Valley provide core habitat suitable for nesting neotropical migrants. The early successional openings and pine forests in addition to the narrow corridors of late successional forests allow dispersal between the mature forest patches. Furthermore, the clear-cut areas are not as extensive as implied by the City of Newport News.

(d) Functional Assessments: The 1990 Memorandum of Agreement (MOA) between the Corps and EPA regarding "The Determination of Mitigation Under the Clean Water Act Section 404(b)(1) Guidelines" states the "objective of mitigation for unavoidable impacts is to offset environmental losses...such mitigation should provide, at a minimum, one for one functional replacement (i.e., no net loss of values), with an adequate margin of safety to reflect the expected degree of success associated with the mitigation plan." The MOA also states "this ratio may be greater where the functional values of the area being impacted are demonstrably high and the replacement wetlands are of lower functional value or the likelihood of success of the mitigation project is low." For more routine smaller-scale projects, acreage is commonly used as a surrogate for wetland functional replacement; therefore, early on in the review process the District set a 2 to 1 wetland creation/restoration compensation ratio as a wetland compensation goal. Due to the magnitude of wetland impacts associated with the proposed King William Reservoir, the District and federal and state advisory agencies emphasized that other methods would be needed to identify and evaluate wetland functional replacement needs (e.g., HEP for wildlife functions).

(i.) Habitat Evaluation Procedures: At an interagency King William Reservoir Wetland Mitigation Workshop held on 02 August 1995 in Fredericksburg, Virginia, it was agreed that a Habitat Evaluation Procedures (HEP) study would be conducted for the project. The HEP analysis was needed to quantify anticipated impacts to the range of habitats existing on the proposed reservoir project site and to determine what would constitute in-kind compensation for habitat impacts. It was also used to determine whether the proposed compensatory mitigation for the reservoir would offset anticipated habitat impacts as well as to identify general types of compensation required to offset habitat impacts.

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An interagency team composed of representatives of the Norfolk District Corps of Engineers, the Environmental Protection Agency, U.S. Fish and Wildlife Service, Virginia Department of Environmental Quality - Water Division, Newport News Waterworks, and Malcolm Pirnie, Inc. was formed in November 1995 to conduct the analysis. In the fall of 1996, the team invited an authority on the application of HEP and habitat models, Dr. Dean Stauffer of Virginia Polytechnic Institute, to attend team meetings, review the analysis, and provide technical advice to ensure that the analysis was scientifically sound and consistent with the principles of HEP. Team decisions on cover type classification, species selection, field sampling protocols, data analysis, and assumptions about habitat succession were made by consensus. As no agency or team member had veto authority over the team's decisions or actions, and reaching consensus was difficult and time consuming, discussions on contentious issues were tabled until the team had completed literature research, field investigations or consulted with local authorities. Only two issues were determined by the Norfolk District rather than by consensus: the life of the project for the HEP analysis was determined by the District to be the 50-year life of the project as identified in the EIS; and the Norfolk District Regulatory Branch practice has consistently been that HEP analyses must show what is required for full in-kind habitat compensation.

Unlike the other functional assessment methods applied to the King William Reservoir project, the HEP study subdivided the King William Reservoir assessment area based on cover type and hydrologic regime. A total of 64 cover types and hydrologic regimes in 9 major categories consisting of both wetland and upland habitats were identified prior to actual habitat analysis: Cove Hardwood, Upland Mixed Forest, Upland Evergreen Forest, Early Successional Logged Area, Palustrine Open Water, Palustrine Emergent, Palustrine Scrub-Shrub, drier Palustrine Forest (Saturated and Temporarily Flooded), and wetter Palustrine Forest (Seasonally Flooded/Saturated and Semi-permanently Flooded). Additionally, HEP can often take landscape position and hydrodynamics into account via species model variables, and limiting the use of species models to specific cover types and geographical areas.

It is also important to keep in mind that HEP does not evaluate all habitat types associated with a given project. The Habitat Evaluation Procedures Workbook (Stiehl, 1995) states "given that you can only study a small portion of the entire wildlife system of concern, it is essential to give adequate time to deciding what parts of the system will be studied and why... regional wildlife resource objectives should be used as the overriding factor guiding the species selection process." The interagency HEP Report lists the Service's regional wildlife resource objectives as protection of habitat for forest interior dwelling birds, species sensitive to forest fragmentation, species that use wetlands and riparian zones, threatened and endangered species, and passage for anadromous fish. In a memo dated 7 November 1995, other regional wildlife resource objectives proposed by the RRWSG for the King William Reservoir included: species that use mature hardwood forests, species of public importance, cavity nester species, and species that are habitat specialists. Twelve evaluation species were chosen to represent several of these regional wildlife resource objectives and some of the more important habitat types present in the King William Reservoir project area. Selected species were representative of the range of fish and wildlife species occurring in a given cover type. Wetland species selected were: beaver (*Castor canadensis*), mink (*Mustela vison*), great blue heron (*Ardea herodias*), wood duck (*Aix sponsa*), and redbreast sunfish (*Lepomis microlophus*). Upland species selected were: brown thrasher (*Toxostoma rufum*), field sparrow (*Spizella pusilla*), and pine warbler (*Dendroica pinus*). Species representing wetland and/or upland were: pileated woodpecker (*Dryocopus pileatus*), yellowthroat (*Geothlypis trichas*) the terrestrial stage of the red-spotted newt (*Notophthalmus viridescens viridescens*) and gray squirrel (*Sciurus carolinensis*). The analysis of habitat impacts associated with the project was broken down into 3 distinct phases: an analysis of gross habitat losses resulting from reservoir construction; an analysis of habitat change

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resulting from construction of the reservoir; and an evaluation of the compensation needed to offset projected habitat losses associated with the project.

Gross habitat losses were determined to be the loss of all potential habitat within the reservoir pool area over the life of the project and constitute a worst-case scenario for habitat impacts. After an analysis of the gross habitat losses, it was necessary to quantify projected habitat changes from the construction of the reservoir, including any habitat gains that might be realized from the creation of shallow water habitat and the extensive reservoir shoreline. While team members agreed that some vegetated wetland fringe would develop along portions of the new reservoir lakeshore, a consensus was not reached on the amount or extent of fringe wetland development or the time frame for habitat development. Thus, wetland fringe acreage was not quantified or considered in this evaluation. In their Mitigation Program, Fish and Wildlife Mitigation Plan and the Environmental Issues Summary, the RRWSG claims that the King William Reservoir would provide an important lacustrine and deepwater habitat, which was not fully evaluated by the HEP study. The interagency HEP study did evaluate and credit the riparian zone and shallower margins of the reservoir. The riparian zone was defined as a 30-meter wide band extending upslope of the proposed reservoir lakeshore. As defined in the HEP beaver and mink models, this zone could include upland and/or fringe wetlands. The deeper portions of the reservoir were not emphasized in the HEP study, because as noted in a 1994 publication by Tiner *et al.* entitled "Recent Wetland Status and Trends in the Chesapeake Watershed (1982 to 1989)", this type of habitat is not limiting factor in the Virginia Coastal Plain. Reservoirs/lakes/ponds were not identified as an important regional wildlife resource objective for this part of Virginia.

Lastly, the interagency HEP team was charged with identifying compensatory mitigation measures needed to provide full, in-kind replacement of habitat losses for all evaluation species. Of the three study goals, the use of the HEP results in design of the wetland compensation package was somewhat limited, because the HEP study was conducted concurrently with development of the wetland mitigation plan. The HEP study results were not finalized until early 1999; by which time at least three drafts of the wetland compensation plan had already been submitted by the RRWSG and reviewed by the agencies. Additionally, at least half of the currently proposed wetland compensation sites had already been identified by the project proponents in the August 1996 Conceptual Mitigation Plan submitted to the Virginia Department of Environmental Quality, well before the analysis of the HEP data and before the formation of the interagency wetland mitigation team. Although there was quite a bit of overlap in members of the HEP and wetland mitigation teams, much of the time spent by the interagency wetland mitigation team in reviewing potential wetland compensation sites concentrated on evaluating sites for "fatal flaws" to debit against the 2 to 1 compensation ratio acreage goal, rather than tallying the sites' cumulative potential for full in-kind compensation of wetland habitat or other wetland functions.

In a memo dated 25 November 1997, the Service supported the parallel tracking of the HEP and mitigation teams because all parties already had an understanding that there was a 2 to 1 wetland creation/restoration baseline goal from which the HEP results would help build and shape an appropriate compensation plan. They felt it was more expedient to have the wetland mitigation team review the feasibility of specific sites, and then later use this real world data to plug into the HEP evaluation of expected habitat gains from proposed compensation sites. The HEP analysis was applied to a sample of the applicant's proposed wetland compensation sites, each of which included restoration/creation of wetlands and preservation of the proposed reservoir buffer area. The team developed models of habitat succession to predict what these sites would look like over a 50-year period in order to evaluate the extent to which these wetland restoration/creation sites would offset habitat impacts and to project the total

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habitat benefits likely from the planned wetland mitigation. This was the strategy previously agreed to by the HEP and wetland mitigation teams, and was continued to the conclusion of the HEP study in 1999. In a comment letter dated 22 December 1998, the Service reiterated their belief that “one of the major beneficial features of the King William Reservoir HEP study is the method of using our 6 identified potential mitigation sites as realistic compensation landscapes”, and that they “believe this report will be an important template for other HEP studies conducted in the Mid-Atlantic states.”

Because the proposed reservoir buffer was not a required part of the project, its size could vary considerably. The HEP team agreed to consider this buffer as a mitigative action and part of a compensation plan for the project, but not as part of the project itself. In May 1998, the applicant adopted plans for a buffer equal to or exceeding 200 feet in width within which no development would occur other than establishment of hiking trails and other passive recreation facilities. In order for the proposed 1,990-acre reservoir buffer to be considered as mitigation for habitat impacts, it had to meet all of the life requisites for a given evaluation species. Also, the habitat gains associated with its preservation over the life of the project had to be evaluated. This entailed projecting future growth and development of upland forest cover in this buffer over the next 50 years. As suitable habitat for the pileated woodpecker consists of large blocks of contiguous mature forest, the team believed that this requirement could not be met within a 200-foot wide band of forest. The team determined that the proposed reservoir buffer would not provide suitable habitat for the pileated woodpecker, but it could offset much of the habitat losses for the gray squirrel and red-spotted newt. (A detailed description of the HEP study is provided in the District’s report entitled “Summary of HEP analysis for the King William Reservoir.”)

The Norfolk District and Service feel that the final HEP Report accurately describes the interagency HEP study performed for the King William Reservoir, and both support the documentation and findings of that document. However, both agencies strongly feel the description of the HEP findings in the Environmental Issues Summary are completely inaccurate and misleading. The RRWSG forwards the opinion that the HEP study indicates the existing Cohoke Creek wetlands provide only moderately suitable habitat for the selected wetland species because the “habitat value average for all species was only 0.51 out of a possible score of 1.0.” They further state habitat values were expected to be high using HEP “since species are only selected which are well suited to this type of habitat.”

The Service made the following comments regarding the RRWSG’s misinterpretation of the HEP findings in the Environmental Issues Summary:

“The Service believes the RRWSG’s presumption, “The results of the HEP gross loss analysis (Malcolm Pirnie, 1999) indicate that the existing wetlands within the pool area provide only moderately suitable habitat for the selected wetland species,” is incorrect and invalidly drawn. The Service is surprised to respond to these misapplications of the Habitat Evaluation Procedures Study, as the consultants for the RRWSG are amply trained to provide the guidance the RRWSG needs in interpreting HEP results. Training in HEP was provided in May, 1996 for the RRWSG’s consultants Malcolm Pirnie, the Norfolk District, and the Service’s Chesapeake Bay Field Office employees in one joint training class. According to the HEP Workbook (revised 7/95) distributed to the class, ‘HEP may be adapted to many different uses, including project planning, impact assessment, mitigation and compensation, and habitat management by providing information for two types of wildlife comparisons: (1) the relative value of different areas at the same point in time, and (2) the relative value of the same area at future points

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in time.' HEP makes quite clear that the values are not absolute values, but only have meaning in the relative sense, when comparing habitats. For example, a habitat suitability index value of 0.55 generally indicates better suitability for a given species, than a score of 0.35. But in no way does HEP say that 0.55 equals mediocre habitat and 0.35 equals bad habitat, as the "Environmental Issues Summary" attempts to portray....

There is no logical foundation in taking the habitat suitability index values across every single habitat type of varying acreages for all species, and compiling these numbers into an "average." There is absolutely no meaning in the 0.51 number, and it is a gross misapplication of HEP to make statements based upon such a numerical exercise. Less than ideal habitats were purposely sampled for most species, because the HEP Team felt that if the habitat had significant potential use by an evaluation species, that habitat should be included. For example, suitability for pileated woodpeckers was assessed in upland evergreen forests (UEF) because these habitats can be used when tree diameters are large. The habitat suitability index value was 0.21 in evergreen forest plots, compared to a value of 0.43 in upland mixed forest plots. The HEP Team was attempting to characterize all useable habitats for a species across the project site in a representative manner, and not skew the results only towards prime habitats. Likewise, mitigation sites were evaluated and credited for these less than ideal habitats for an evaluation species. In addition, a value of 0.43 for pileated woodpecker has no equivalence to a value of 0.43 for red spotted newt, because the species models are constructed much differently, and their component variables are scaled differently."

The Norfolk District acknowledges that the Service is the recognized federal expert regarding the application and interpretation of HEP studies and I have no reason to disagree with their determination that the applicant misinterpreted the HEP results.

In accordance with current Norfolk District practice, all HEP studies completed for proposed projects in the District boundaries must demonstrate what types of compensation strategies would be required for full, in-kind fish and wildlife habitat replacement. The HEP Report outlines a series of alternative mitigation strategies that would provide full, in-kind habitat compensation for all the evaluation species.

Out of numerous potential compensation scenarios, the HEP Report provided four compensation strategies that would provide full, in-kind habitat compensation. One of those identified strategies would provide full, in-kind habitat compensation with the least acreage of land and still meet the 2 to 1 compensation ratio for wetland impacts due to reservoir construction. That strategy consists of the reservoir, a 1990-acre reservoir buffer, another 228 acres (in 3 parcels) contiguous with the buffer, 806 acres of wetland restoration/creation, 406 acres of forested wetland preservation, 586 acres of managed evergreen forest (i.e. pine plantation), 145 acres of managed oldfield (managed pasture), and 208 acres of reconnected backwaters. It should be emphasized that this strategy is only one possible theoretical compensation plan that would provide full, in-kind wildlife habitat replacement. The compensation plan currently proposed by the RRWSG differs from all scenarios outlined in the HEP Report and is discussed below.

Table 10-3 in the Mitigation Program, Fish and Wildlife Mitigation Plan outlines RRWSG's currently proposed compensation plan as it relates to HEP. The plan proposes 275 acres of lacustrine habitat from the reservoir proper, 1990 acres of buffer surrounding the reservoir, 806 acres of wetland creation/restoration, 769 acres of upland restoration, 211 acres of forested upland preservation, 436 acres

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of forested wetland preservation, 20 acres of stream restoration, preservation of areas downstream of KWR-IV (186 acres of wetland preservation and 620 acres of upland preservation), and 73 acres of King William Reservoir pipeline management.

The preservation of areas downstream of KWR-IV and management of the King William Reservoir pipeline easement were not reviewed as compensation strategies by the interagency HEP or mitigation teams and are not suitable compensation measures. Areas downstream of KWR-IV are unacceptable for mitigation because they would likely be impacted by the current project, the RRWSG has not agreed to preserve these areas in perpetuity, and the RRWSG plans to further impact this area by future downstream enlargement of the currently proposed reservoir. The proposed pipelines associated with the King William Reservoir would require the clearing and maintenance of new linear easements, which would result in the conversion of mature wetland and upland habitat to early successional states.

Additionally, since HEP was not used to quantify habitat loss resulting from the new pipeline (directly associated with the new proposed reservoir), it is not consistent to attempt to apply HEP solely for compensation credit for this aspect of the project. In a memo dated 22 December 1998, the Service recommended that the RRWSG look to compensate for impacts to early successional species by managing existing overhead powerline easements on Newport News Waterworks property, not by clearing and maintaining new utility line easements. The King William Reservoir pipeline right-of-way does not represent a possible habitat compensation measure, but rather represents additional habitat impacts (see Section 8 f. (2) (b), Wetland Conversion Impacts). Therefore, the KWR-IV downstream areas and King William Reservoir pipeline management areas should be eliminated from RRWSG's proposed compensation plan; and more reasonably should be considered as additional impacts to aquatic resources.

The RRWSG has proposed compensating for redfin pickerel habitat loss through stream restoration on the South Anna River in Louisa County, Virginia, and has calculated habitat unit gains using the redfin pickerel's HEP model. However, the District was unable to determine how the RRWSG quantified anticipated habitat unit gains for the redfin pickerel when no details on the scope of stream restoration work in the headwater reaches of the South Anna River were provided in their Mitigation Program, Fish and Wildlife Mitigation Plan. The RRWSG never identified any existing potential mitigation sites for review by the interagency HEP team that might compensate for anticipated impacts to the redfin pickerel. Since this aspect of the compensation plan was never reviewed by the interagency HEP team, the District questions the validity of applying the redfin pickerel model to the proposed stream restoration area. The Mitigation Program, Fish and Wildlife Mitigation Plan, provides no details on what field data (if any) was collected from the proposed stream compensation sites, or other assumptions that would be needed to apply the redfin pickerel model to the proposed compensation area. Without this information, the District must reject the applicant's claims for any redfin pickerel habitat unit gains as stated in the Mitigation Program, Fish and Wildlife Mitigation Plan.

The interagency HEP team agreed that habitat losses associated with the proposed compensation measures (e.g., the proposed King William Reservoir buffer and wetland mitigation sites) would be noted qualitatively as losses, but would not be quantified and counted against the project since compensation measures are viewed as being a net benefit. For example, preservation of the proposed reservoir buffer would allow the forest to mature and technically result in loss of existing habitat for early successional species (e.g., yellowthroat). The HEP team acknowledges this loss of early successional habitat, but it is not counted in the total habitat loss for the overall King William Reservoir project. In Table 10-3 of the

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Mitigation Program, Fish and Wildlife Mitigation Plan, it should be noted that the habitat losses recorded for the proposed reservoir buffer were shown, but not used to calculate the overall habitat losses for the pileated woodpecker, pine warbler, brown thrasher, field sparrow, or yellowthroat.

With the reservoir, the currently proposed buffer, and the proposed wetland mitigation sites, habitat impacts would be fully offset for beaver, mink, great blue heron, wood duck, red-spotted newt, gray squirrel, brown thrasher and yellowthroat. The regional wildlife resource objectives represented in part by these evaluation species include: species that use riparian zones, species of seasonally saturated forested wetlands, species that use wetland scrub-shrub habitat and shrub habitats of later successional upland areas; species that use shallow permanently flooded wet areas, species of upland forests, species that utilize mast-bearing forests, and species that utilize early successional forest habitat. These evaluation species were also chosen to represent, in part, the following habitat types: palustrine forested wetlands, palustrine scrub-shrub wetlands, palustrine emergent wetlands, shallow water portions of lacustrine systems, cove hardwood forests, and early successional logged areas.

The RRWSG's compensation plan fails to offset habitat losses for the redfin pickerel, pileated woodpecker, pine warbler, and field sparrow. The regional wildlife resource objectives represented by these evaluation species include: species that use wetlands, species sensitive to forest fragmentation, species that use mature hardwood forests, species of public importance, cavity nester species, species that are habitat specialists, and protection of habitat for forest interior dwelling birds. These evaluation species were also chosen to represent the following habitat types: low-gradient, slow-moving, vegetated riverine habitat; large unfragmented tracts of mature forest (cove hardwood, upland evergreen forest, upland mixed forest, and all forested wetland cover types); and early successional habitats.

The HEP analysis demonstrates that the proposed mitigation package does not fully compensate for either wetland or upland habitat losses from the King William Reservoir. The RRWSG's proposed compensation plan provides no compensation for impacts to redfin pickerel habitat. This underscores how a diverse, low-gradient lotic system with associated vegetated wetlands cannot be compensated by an out-of-kind mitigation package comprised of a lentic/lacustrine reservoir and depressional wetland creation/restoration sites. Although the proposed reservoir buffer is large in acreage (estimated 1,990 acres), it would be comprised of a narrow forested band along the entire perimeter of the proposed reservoir. Habitat value would largely be limited to those species that utilize lacustrine riparian fringe (as defined in the HEP species models for beaver and mink), as was appropriately credited in the HEP study for the project.

The Environmental Issues Summary claims that "these analyses thoroughly demonstrate the benefits of the King William Reservoir coupled with successful implementation of the Mitigation Program will more than compensate for any functions and values reduced by construction of the King William Reservoir", and "the replacement package would more than compensate for the wetland habitat impacted in the project area...[i]n addition to compensating for all wetland habitat losses from the King William Reservoir...." I strongly disagree. Despite claims to the contrary on page 4 of the letter from Newport News dated 27 November 2000 in response to EPA's comments on the Environmental Issues Summary, there was never a consensus from the interagency HEP team that the King William Reservoir and mitigation sites would result in a net gain of habitat units; and no such documentation is included in the HEP Report. In accordance with Norfolk District practice, the HEP study identified theoretical compensation measures that would be required to provide full in-kind compensation for anticipated King

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William Reservoir impacts to wildlife habitat, but the RRWSG has never submitted a mitigation plan that would fully compensate for wetland dependent fish and wildlife habitat losses.

(ii.) Wetland Evaluation Technique (WET): In 1993, without the benefit of input/concurrence on model assumptions from the District or any advisory agencies, the project proponents performed a Wetland Evaluation Technique (WET) study to qualitatively compare the probability of wetland functions for a proposed Ware Creek Reservoir site, a proposed Black Creek Reservoir site, and the proposed King William Reservoir (KWR-II configuration) as part of their alternatives assessment. The details of this exercise were reported by the RRWSG in the EIS.

In the Environmental Issues Summary, the RRWSG states that “numerous analytical techniques have been applied to evaluate the quality of the wetlands within the King William Reservoir project area, and mitigation sites”, and cites WET as one of these techniques. WET was not performed on any of RRWSG's proposed wetland mitigation sites; therefore, the RRWSG cannot make any claims that the WET study helps demonstrate their wetland mitigation package provides full, functional replacement of lost wetland functions. It is important to emphasize, as noted by Malcolm Pirnie in their WET study, that “the qualitative probability ratings assigned by WET are not direct estimates of the magnitude of a wetland function or value... [r]ather they are an estimate of the probability that a function or value will exist or occur in the wetland (to an unspecified magnitude).” Malcolm Pirnie further correctly states “probability ratings assigned by WET do not measure magnitude and consequently the assignment of numerical values to probability ratings are inappropriate and misleading.” The Norfolk District disagrees with the RRWSG's inferences and conclusions that the WET results are an estimate of the magnitude that the Cohoke Creek wetlands in the King William Reservoir project area perform different wetland functions.

Although the existing Cohoke Creek system is recognized as being a diverse and complex wetland system, Malcolm Pirnie made the assumption that the entire wetland complex could be evaluated as a single assessment area. In the District staff's opinion, this is an oversimplification of the Cohoke system and reduces the resolution of an already simplified rapid assessment methodology, which further limits the reliability of the WET results. Considering the Cohoke Creek wetlands as a single assessment area also runs counter to Malcolm Pirnie's own reasoning in their subsequent Evaluation for Planned Wetlands (EPW) study where they state “the complex nature of the wetlands suggest[s] that each wetland functions slightly differently from the others...it was not feasible to assess the entire project area as one wetland.” (EPW is discussed in (iii) below). This error in defining the King William Reservoir assessment area led the RRWSG to erroneously conclude that the WET analysis identified the Cohoke Creek wetlands as providing “low aquatic diversity and abundance functions” in the Environmental Issues Summary. Limited knowledge of the Cohoke system at the time Malcolm Pirnie conducted the WET study is illustrated by the fact that they estimated the extent of wetlands to be 293 acres for the KWR-II configuration. This was clearly a gross underestimation of the wetland acreage in the KWR-II project area because a later detailed wetland delineation of this same project area identified 574 acres of wetlands (an error of 196%).

The WET study emphasized how a few characteristics of the King William Reservoir assessment area influenced several of the wetland function ratings. For example, the fact that the King William Reservoir assessment area represents a large percentage of the total palustrine wetlands within the Cohoke watershed appeared to be a controlling factor in the social significance ratings for the following functions: groundwater recharge, groundwater discharge, sediment/toxicant retention, nutrient

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removal/transformation, aquatic diversity and abundance, and uniqueness/heritage. This underscores how the elimination of the majority of headwater wetlands in the upper Cohoke Creek watershed by construction of the King William Reservoir would likely result in the loss/reduction of diverse wetland functions within the downstream portions of the Cohoke valley.

In the Environmental Issues Summary, RRWSG states “based on the WET analysis, the wetlands within the [King William Reservoir] pool area received low scores for nutrient removal/transformation.” Notwithstanding the problems and limitations of the WET study as outlined above, this finding contradicts their own subsequent EPW evaluation that concluded “the [EPW] evaluation indicate[s] the existing [Cohoke Creek] wetlands provide a high degree of sediment stabilization and water quality functions” as stated in the Mitigation Program, Fish and Wildlife Mitigation Plan. Although their EPW study had shortcomings of its own (see below), the Cohoke Creek wetlands are assumed to perform important sediment stabilization and water quality functions due to the low gradient nature of the Creek and generally slow water movement through extensive vegetated wetland systems and beaver pond complexes.

In the Environmental Issues Summary, the RRWSG stated the WET study demonstrates that the Cohoke Creek wetlands scored low on groundwater recharge, and provide only moderate export functions. Most wetlands in the Cohoke Creek area are underlain by fine-textured soils with low permeability rates, so it does seem reasonable for the project area wetlands to have a low probability for groundwater recharge functions. The Norfolk District agrees. Since the Cohoke Creek wetlands are part of a low gradient riverine system it seems reasonable to expect that they have at least a moderate probability of performing export functions.

The project proponent's original goal of the WET study was to use it as a screening tool to evaluate three proposed reservoir alternatives. Despite the shortcomings of the study assumptions as detailed above, the District did not object to this application of WET considering the stated goal and the fact that the level of review (and error) was applied uniformly to the three alternatives. The RRWSG has tried to use the results of WET's relative comparison of wetland functions between three different reservoir alternatives to make specific conclusions about the magnitude of functions performed by the Cohoke Creek wetlands. This is clearly a misinterpretation of the WET study results, and is a misapplication of a simple assessment methodology beyond its intended use. I must, therefore, reject this use of the WET study by the RRWSG.

(iii.) Evaluation for Planned Wetlands (EPW): In 1996 the project proponents, without the benefit of input/concurrence on model assumptions from the District or any advisory agencies, performed an Evaluation for Planned Wetlands (EPW) study that reportedly compared the wetland functions of the existing wetlands within the King William Reservoir project area (KWR-II configuration) to the collective wetland functions of several proposed wetland mitigation sites. The details of this exercise are given in the Regional Raw Water Study Group Conceptual Mitigation Plan for the Department of Environmental Quality. In a letter dated 23 February 1996, the U.S. Fish and Wildlife Service stated that EPW is too limited to be solely used to evaluate lost wetland functions resulting from construction of the King William Reservoir. More specifically they were concerned that as a rapid assessment technique, EPW inherently has a low level of accuracy, is intended for smaller acreages, and the assessment level is too coarse to be applicable to such a large wetland complex as the Cohoke Creek system.

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The Service stated that the results of an EPW assessment could be useful as long as its assumptions and limitations were recognized. In a letter dated 7 March 1996, the EPA concurred with the recommendations of the Service. Malcolm Pirnie had collected the EPW field data for the King William Reservoir project area in mid-February 1996, but it was not until their letter of 27 March 1996 that Malcolm Pirnie requested concurrence from the reviewing agencies on the goals and assumptions of the EPW study. In a letter dated 28 March 1996, the District stated that while EPW can be a valuable tool for rapid assessment of small wetlands areas, it is too limited to provide the detail needed for analysis of the King William Reservoir. In a response letter dated 4 April 1996, the Service stated it was unfortunate that Malcolm Pirnie did not coordinate the assumptions and goals before collecting the field data, and found “the assumptions made by Malcolm Pirnie for evaluating the planned wetland to be without scientific merit in the case of the proposed King William reservoir site, and rejects them as inappropriate.”

EPW classifies non-tidal wetlands into three broad categories: non-tidal (stream/river), non-tidal (pond/lake) and non-tidal (depression). Using this simplistic classification scheme, the Cohoke Creek wetlands would be considered to be of the non-tidal (stream/river) class, the proposed reservoir would be classified as non-tidal (pond/lake), and the majority of the proposed mitigation sites would be classified as non-tidal (depression). The proposed King William Reservoir and wetland mitigation sites represent lentic/depressional systems, and clearly cannot provide in-kind replacement for the anticipated impacts to the Cohoke Creek lotic/riverine system.

Several of the wetland mitigation sites used in the EPW study have since been determined to be unacceptable after subsequent review by the District and other advisory agencies. Also, it is important to note that in addition to candidate mitigation sites that had actually been identified by Malcolm Pirnie staff, approximately 510 acres of unidentified “additional sites” were evaluated, and without explanation, given quantitative scores of functional capacity for each of the six wetland functions assessed by EPW as part of RRWSG’s 1996 mitigation package. The total wetland acreage of the mitigation sites used in the EPW study was 1100 acres, which is at least 294 acres more than the RRWSG has ever reported to have actually found for mitigation.

Another drawback of the EPW study was that the timeframe for assessment of the mitigation sites was assumed to be when these sites are fully functional, self-sustaining, mature systems. It completely disregards the temporal loss of functions for more structurally complex wetlands (e.g., forested wetlands) that occur while the system matures, which can make up a substantial portion of the 50-year project evaluation period.

In the Environmental Issues Summary, the RRWSG states that “numerous analytical techniques have been applied to evaluate the quality of the wetlands within the King William Reservoir project area, and mitigation sites”, and cites EPW as one of these techniques. Considering the above, the District staff believes that the RRWSG’s claim that their EPW study compares the wetland functions of the Cohoke Creek wetland system to the proposed mitigation sites is unsupportable. The Cohoke Creek system and the proposed mitigation sites belong to at least two different EPW wetland classes (i.e. are out-of-kind), and comparisons between them cannot be validly made. Additionally, almost half of the study’s total mitigation acreage was comprised of sites to be identified in the future, which artificially inflated the Functional Capacity Unit scores for the proposed wetland mitigation sites. The ability of EPW to assess the degree to which the Cohoke Creek wetlands perform different wetland functions is discussed below.

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EPW was mainly designed for assessing and comparing a wetland assessment area against a planned (created/restored) wetland. In this case the wetland assessment area is broadly considered to be the Cohoke Creek wetland complex in the KWR-II project area. Malcolm Pirnie chose to break the Cohoke Creek wetland complex into six wetland assessment area categories based solely on vegetative cover type (e.g., forested, forested/emergent, forested/scrub-shrub, emergent, etc.). By focusing solely on cover type for defining wetland assessment areas, the EPW study lumped wetlands with different landscape positions and hydrologic regimes all together within the same wetland assessment area. The EPW study obscures any realistic assessment of the functional capacity of the Cohoke wetlands by including several different wetland functional groups within a single wetland assessment area category. As was the case with RRWSG's WET assessment, this oversimplifies the Cohoke wetland system, and can lead to erroneous and unsupportable conclusions.

In the Environmental Issues Summary, the RRWSG claims the EPW study shows that the Cohoke system only provides a moderate degree of fish and wildlife functions. Since the fish and wildlife functions of the Cohoke Creek wetlands were assessed by a more data-intensive HEP investigation, those results are considered to be more accurate than the EPW study. According to the applicant's EPW study, the Cohoke Creek wetlands in the project area scored high for shoreline bank erosion control, sediment stabilization, water quality, and uniqueness/heritage functions.

(iv.) Total Net Primary Productivity (TNPP): Without the benefit of input/concurrence on assumptions from the District or any advisory agencies, the project proponents performed a Total Net Primary Productivity (TNPP) study in 1998 based largely on published information to compare estimated TNPP values for existing conditions to predicted future conditions. More specifically, TNPP estimates for existing Cohoke Creek communities within the proposed KWR-IV project area and existing land uses of proposed mitigation sites (i.e., cropland and mined sites) were compared to the predicted future conditions of the King William Reservoir with a wetland fringe and fully mature wetland mitigation sites.

TNPP is a measure of the rate at which solar energy is converted into chemical energy and stored by primary producers, less the amount of energy expended to maintain the metabolism of the primary producers. TNPP is usually expressed in terms of the amount of carbon fixed per unit area per unit time. Rates of TNPP are variable and fluctuate with environmental conditions and stresses on the environment. As such, TNPP is a fundamental ecological variable that provides some insight into energy (carbon source) input to an ecosystem, as well as trends due to changes in land use. TNPP for vascular plant communities is calculated by summing two components, aboveground net primary productivity and belowground net primary productivity. It appears that the belowground net primary productivity component was not factored into the applicant's TNPP assessment.

There is some concern regarding the reference sites used to estimate TNPP values for the open water and littoral zone of the proposed King William Reservoir. The RRWSG did not provide enough information to assess the validity of using the open water productivity data sources, and they failed to demonstrate that the extent of fringe wetland development can be quantified. Although the two cited reference reservoirs are located in the eastern United States (Occoquan Reservoir in Virginia and Dog Lake in Georgia), the degree that they may be similar/dissimilar to the proposed King William Reservoir in depth, seasonal stratification patterns, trophic state (e.g., oligotrophic, eutrophic, etc.), littoral/pelagic ratio, growing season, landscape position, presence/absence of stream inputs, catchment size and catchment land use composition was not factored into the assessment, but can greatly influence TNPP values.

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Other factors that complicate the direct extrapolation of TNPP data from existing reservoirs to the proposed King William Reservoir is the fact that the proposed reservoir would not be a terminal reservoir, and the proposed Mattaponi River pumpover would be the major source of water for the new reservoir. The proposed pumpover would transfer water from a low landscape position (lower reaches of the Mattaponi River) to a much higher landscape position (upper reaches of Cohoke Creek). The nutrient content, turbidity, residence time within the pool area before being transferred to the Newport News Waterworks distribution system, etc., would all have to be factored in to calculate TNPP rates for the proposed King William Reservoir. Information provided by the applicant already shows that some predicted water quality characteristics (i.e., nitrogen and phosphorus levels) of the proposed pumpover are very different from that of the existing Cohoke Creek project area. Because of the Mattaponi pumpover and continual reservoir withdrawals, the overall water quality of the proposed King William Reservoir would be very unlike any other existing reservoir even if it is sited in a similar landscape position.

As with any study, the validity of the assumptions dictates the reliability of the conclusions. An oversight common to most of the “functional assessments” undertaken solely by the project proponents is that they overlooked the time delay it takes for the wetland and upland creation/restoration sites (i.e., early successional habitats such as cropland, recent clearcuts) to develop into mature forested wetland and upland habitats. Although this temporal loss can account for a large portion of the 50-year study period, the project proponents continually evaluated the proposed mitigation sites as fully mature systems starting the first year these compensation sites would be constructed. This is not a realistic assumption and can lead to inflated estimates of functional gains from the proposed mitigation sites over the project evaluation period. More accurate trends could be estimated using the same methodology as employed by the King William Reservoir interagency HEP team.

In order to obtain a more accurate indication of the anticipated change in TNPP for the overall project, District staff recalculated Malcolm Pirnie's model using the modified TNPP figures for swamp forest and cropland which incorporate an estimate of Belowground Net Primary Productivity. With the District's modifications, the King William Reservoir (including mitigation sites) would result in an increase in aquatic TNPP of between 6,600 and 3,300 tons of carbon per year, and a decrease in terrestrial TNPP of between 14,600 and 7,300 tons carbon per year. Therefore, the King William Reservoir (including mitigation sites) would result in an overall loss of TNPP between 8,000 and 4,000 tons carbon per year. It is important to note again that these numbers only represent general trends, because of the problems with TNPP estimates for other vascular plant cover types and other flawed assumptions of the assessment. If more realistic TNPP estimates were used for all cover types, in all likelihood the King William Reservoir would result in an even greater net loss of TNPP, because the TNPP estimates for the other vascular plant cover types were underestimated. (A more detailed discussion of the problems with the assumptions made in this study, can be found in the Functional Assessments Section of the Norfolk District's report entitled “Analysis of wetland and habitat impacts and the Regional Raw Water Study Group's proposed compensation for the proposed King William Reservoir.”).

Without considering the off-site mitigation sites (existing or proposed conditions) and looking only within the proposed pool area of the Cohoke valley, the King William Reservoir would still result in a net loss of TNPP. This loss results from the conversion of a natural and productive upland/wetland riverine complex (Cohoke valley) to an artificial and relatively unproductive open water habitat (King William Reservoir). An important point not addressed at all by the project proponents is the way these two systems are inherently different, not only in TNPP rates, but also in the fate of fixed carbon from a landscape perspective. Although influenced by the composition of its catchment, TNPP cycles in reservoirs are

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generally closed; therefore, claims by the RRWSG that TNPP within the proposed King William Reservoir proper constitutes a net benefit to the Pamunkey River or the Chesapeake Bay are misleading.

Riverine systems differ in that organic matter originating and processed (i.e., broken down to different degrees) in the upper reaches of the stream network are transported downstream and utilized by sequentially lower reaches of the stream network. In The Ecology of Regulated Streams, Cummins describes the nutrient spiraling concept of lotic (riverine) systems as “the dependence of downstream communities on upstream processes--communities in each successive stream order are dependent upon the inefficiency or 'leakage' from the preceding orders.” He goes on to describe the river continuum concept as “the balance between primary production and respiration, and between storage-processing and export constitute basic features of lotic systems that change along a continuum with stream order and would be significantly affected by altered flow regime.”

Impounding a large portion of the headwaters and associated riparian areas of Cohoke Creek to construct the King William Reservoir would result in a severe alteration to the existing balance, and there would be impacts downstream at least to and including Cohoke Millpond. The proposed King William Reservoir dam would have the potential to significantly reduce the amount of fixed carbon and inorganics that are transported to and support downstream portions of the Cohoke Creek system. This viewpoint is consistent with Malcolm Pirnie's own statement that the existing Cohoke Millpond prevents “the aquatic productivity of upstream [Cohoke Creek] wetlands from being available to the downstream tidal Pamunkey River system.” In the letter from Newport News dated 27 November 2000 (page 3) responding to EPA's comments on the Environmental Issues Summary, this same viewpoint was reiterated as “Cohoke Millpond Dam also blocks nutrient and sediment export to the York River Ecosystem and has, therefore, altered the hydrology of Cohoke Creek.” Therefore, construction of the King William Reservoir has the potential to also alter TNPP rates both within the reservoir pool area and also to downstream reaches of Cohoke Creek, and yet these impacts have not been addressed in Malcolm Pirnie's TNPP assessment.

(v.) Sediment Retention and Nutrient Assimilation: In 1998 the project proponents, without the benefit of input/concurrence on assumptions from the Corps or any advisory agencies, performed an evaluation that compared predicted nutrient assimilation and sediment retention rates of the existing Cohoke Creek watershed and the Mitigation Site watersheds to the predicted post-project conditions. These studies were based largely on published information and assumptions made by the applicant. The findings of these exercises are summarized in the RRWSG's Mitigation Program, Fish and Wildlife Mitigation Plan and the Environmental Issues Summary.

Malcolm Pirnie made the assumption that maximum nutrient assimilation and sediment retention functions would be performed the first year after construction of the project. Although this may be a reasonable assumption for comparisons in the Cohoke Creek watershed, it would tend to overestimate benefits in the watersheds of the mitigation sites since it would take a large portion of the project evaluation period for the proposed mitigation sites to mature. Changes in these functions could be more realistically quantified by assessing temporal differences by successional stage as was done for the HEP.

To obtain more realistic predictions of existing nutrient loading rates and sediment loss at the proposed compensation sites, landscape position, proximity of other cover types and existing use of cropland/forestry/mining best management practices (BMPs) should have been evaluated. The York River is considered a non-point source dominated system, and the utilization of BMPs is the focus of the

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state's water quality control strategy for this waterway. These factors were not considered by Malcolm Pirnie, and average estimated loading rate values were simply applied to the different cover types with the assumption that pollutant loads (nutrient and sediment) for the different cover types would ultimately end up unabated in the Chesapeake Bay. Such generalizations could easily result in estimates that are not representative of actual pollutant loading rates or sediment loss within the watersheds of Cohoke Creek or the proposed mitigation sites. There is no question that conversion of cropland to pre-disturbance wetland/upland forest conditions will result in reduced nutrient and sediment loading rates from these areas, but there are other factors that need to be considered. Any conclusions drawn from this study should recognize the limitations and general nature of the assessment.

The project proponents summarized the results of their assessment of nutrient and sediment retention in Table 10-2 of their final Mitigation Program, Fish and Wildlife Mitigation Plan. The areas of the Cohoke Creek watershed and the Mitigation Site Watersheds were evaluated and the nutrient and sediment retention for existing and proposed cover types was compared. The acreage of existing cover type for the Cohoke Creek watershed was the same as that of the proposed cover type; however, in evaluating the Mitigation Site Watersheds, Malcolm Pirnie disregarded the acreage of the actual mitigation areas. Therefore, the proposed cover types in the Mitigation Site Watersheds consisted of 794 acres less than in the existing cover types. Malcolm Pirnie assumed it was valid to exclude this acreage from the Mitigation Site Watersheds proposed acreage because the difference in acreage represents the proposed wetland mitigation areas which they claim "are considered sediment retention and nutrient assimilation treatment areas and are not included as a component of the contributing drainage areas." This assumption is invalid because it was not consistently applied to the Cohoke Creek watershed where pollutant loading and retention/assimilation rates were applied to both the existing Cohoke Creek wetlands and the proposed King William Reservoir. Also, following Malcolm Pirnie's logic, any changes in retention/assimilation of pollutant loads could just be due to removing this acreage from the assessment. For consistency, the District added 749 acres to the proposed Mitigation Site Watersheds acreage and assigned the respective wetland loading/assimilation efficiencies (see discussion below for results).

Malcolm Pirnie also assumed "Sediment and nutrient assimilation efficiencies for existing mitigation site conditions are assumed negligible, because these areas are predominantly agricultural fields and disturbed sites (mined sites)...net export systems." Again this is an invalid assumption since the net export nature of these cover types is already factored into the assessment by the changes in cover type acreage (existing vs. proposed) and in the different estimated loading rates for each cover type. Additionally, Malcolm Pirnie's assessment only incorporates sediment retention and nutrient assimilation efficiencies for wetland and reservoir cover types, and does not provide individual retention/assimilation rates for any other cover type (e.g., forestland, early successional logged areas, or agricultural fields). Therefore, the assessment calculates any overall retention/assimilation efficiencies for a watershed using the assumption that stormwater runoff from the catchments would funnel through either wetlands or open water (reservoir) before ultimately reaching the Chesapeake Bay. Considering the fact that all the proposed wetland mitigation sites ultimately drain downslope to existing natural wetland systems, the District reran the assessment using wetland retention/assimilation rates for the cover type acreages of the proposed Mitigation Site Watersheds. Other problems with the assumptions used in the assessment are addressed in the appropriate sections that follow.

Nutrient Assimilation: The nutrient assessment focused on nitrogen and phosphorus due to their importance in regulating the water quality of saline and non-saline aquatic environments, respectively, as discussed in the papers entitled "Nonpoint Source Pollution of Surface Waters With Phosphorus and

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Nitrogen” by Carpenter *et al.* in 1989 and “Nutrient Pollution of Coastal Rivers, Bays and Seas” by Howarth *et al.* in 2000.

In addition to the problems with the assumptions of Malcolm Pirnie’s assessment described above, the project proponents try to claim nitrogen and phosphorus treatment of the Mattaponi pumpover volumes as a net benefit of the project to the Chesapeake Bay. The pumpover should be viewed as an additional impact resulting from the project because it would elevate nitrogen and phosphorus loading rates to the proposed reservoir pool area and potentially to downstream reaches of Cohoke Creek. Using Malcolm Pirnie’s numbers, the pumpover alone would increase nitrogen loading by 4,500 lbs/year and would increase phosphorus loading rates to Cohoke Creek by 10,200 lbs/year above the current loading levels within the proposed reservoir pool area, and potentially to downstream reaches of Cohoke Creek. Since the proposed King William Reservoir is not a terminal reservoir, to better quantify treatment efficiencies of the pumpover by the reservoir and potential effects to downstream areas the project proponents would have to factor in the respective volumes of the pumpover that would enter the waterworks distribution system, the residence time of pumpover volumes staying within the King William Reservoir, and volume and nutrient concentrations of pumpover to be released to downstream portions of Cohoke Creek. Additionally, the applicant only followed the proposed pumpover to the proposed reservoir pool area, but to assess the impact of the project on water quality in the Chesapeake Bay the study would have to track this water through the waterworks system and intended use, ending with effluent discharge from the Hampton Roads Sanitation District. For these reasons, the Mattaponi pumpover should not be included in the nutrient assessment.

Malcolm Pirnie made some miscalculations that resulted in an overestimation of the nitrogen retention rate of the existing wetlands within the Cohoke Creek Watershed, an underestimation of the phosphorus retention rate of the existing wetlands within the Cohoke Creek Watershed, and an overestimation of the nitrogen retention rate of the proposed wetland mitigation sites within the Mitigation Sites Watershed. Using corrected figures the District recalculated the assessment to get an idea of general nutrient budget trends. Based on these modifications, the proposed King William Reservoir and mitigation sites would result in net assimilation of 11,826 pounds of nitrogen per year and 48 pounds of phosphorus per year in excess of that assimilated by the existing Cohoke Creek wetlands and unimproved mitigation sites. The majority of the reduction in pollutant loading would come from taking existing cropland and logged areas out of production for new use as potential wetland compensation sites. Although this assessment predicts there would be a net reduction in nutrient loading with the King William Reservoir project, by ignoring existing barriers to flow (e.g., Cohoke Millpond, BMPs, etc.) the assessment cannot accurately quantify existing levels of nutrient inputs to the Pamunkey River or Chesapeake Bay. Considering this assessment’s level of resolution, it is difficult to conclude the project would result in an overall reduction in phosphorus inputs to the York River watershed. (A more detailed explanation can be found in the Functional Assessments Section of the Norfolk District’s report entitled “Analysis of wetland and habitat impacts and the Regional Raw Water Study Group’s proposed compensation for the proposed King William Reservoir.”)

What is evident from the assessment is that both nitrogen and phosphorus inputs to the proposed reservoir pool area (and potentially downstream portions of Cohoke Creek) will significantly increase due to construction of the proposed King William Reservoir and introduction of pumpover from the Mattaponi River. No amount of offsite mitigation will alleviate this increase in nutrient loading within Cohoke Creek proper, with a net result being that downstream reaches of Cohoke Creek (at least to and including Cohoke Millpond) would potentially be impacted by elevated nutrient inputs.

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Sediment Retention: Sediment dynamics are important not only for tracking erosion/deposition patterns within the landscape, but also as an aid in assessing the fate of adsorbed pollutants (e.g., phosphorus) and overall water quality (e.g., turbidity).

The problems with Malcolm Pirnie's assumptions described above apply to both the nutrient and sediment assessments. However, an additional error was made that is specific to the sediment retention analysis. The entirety of the existing Mitigation Site Watersheds should not be assumed to lack all sediment retention value. Since all mitigation sites ultimately drain to existing natural wetlands, the sediment retention value for the existing (unimproved) wetland mitigation sites is estimated to be 396 tons/year (566 tons/year sediment loading rate for all existing cover types in the Mitigation Site Watersheds with a wetland sediment retention rate of 70%).

While still acknowledging the shortcomings of the study assumptions, the District recalculated the assessment using the changes described above to get an idea of general sediment budget trends. Based on these modifications, the proposed King William Reservoir would retain approximately 85 tons of sediment per year more than that currently retained by the existing Cohoke Creek wetlands, and the proposed wetland compensation sites would result in added retention of approximately 106 tons of sediment per year. Although the existing Cohoke Creek wetlands undeniably perform important sediment retention functions, sediment is still naturally transported downstream. This downstream transport of sediment is not only normal, but is essential for the natural maintenance of a healthy riverine system as described in Fluvial Processes in Geomorphology by Leopold, *et al.* in 1964; and in the paper entitled "Downstream Ecological Effects of Dams" by Ligon, *et al.* in 1995, as well as Restoration of Aquatic Ecosystems by the National Research Council in 1992. The extent and structure of the existing downstream Cohoke Creek wetlands reflect the natural balance of erosion and sediment deposition rates that have resulted from the existing character of the catchment (e.g., land use). Malcolm Pirnie predicts that the King William Reservoir dam would increase sediment storage in the upper Cohoke Creek watershed, which by default would have to result in deprivation of sediment to downstream wetlands and riverine habitat. Such sediment deprivation could result in changes in channel patterns (e.g., loss of braided channels), changes to channel dimensions, reduction in sediment deposition rates that maintain downstream floodplain and riparian habitats (including vegetated wetlands), changes in nutrient dynamics, etc. This alteration of sediment dynamics in Cohoke Creek should be viewed as an environmental impact rather than a project benefit. This viewpoint is consistent with the detrimental effects of the existing Cohoke Millpond as viewed by Malcolm Pirnie in the Mitigation Program, Fish and Wildlife Mitigation Plan and the City of Newport News (letter dated 27 November 2000 to address comments from the EPA).

It does seem reasonable to expect improved sediment retention from taking existing cropland out of production for use as wetland mitigation sites, but due to the limitations of this assessment, the magnitude of the predicted sediment retention improvement outside of the Cohoke Creek watershed is unknown. By taking active cropland out of production, the establishment of the proposed wetland mitigation sites would likely result in benefits to the aquatic environment by reducing nutrient levels and sediment loads. However, the proposed project would result in alterations to the nutrient and sediment dynamics within Cohoke Creek, which cannot be compensated by the proposed mitigation plan. Nitrogen and phosphorus levels would be elevated within the proposed pool area and potentially to downstream reaches of Cohoke Creek. The proposed dam would result in excessive sediment retention that over the long-term would detrimentally impact portions of Cohoke Creek, at least downstream to the Cohoke Millpond.

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(vi.) Floodflow Alteration: In 1996 the project proponents, without the benefit of input/concurrence on assumptions from the Norfolk District or any advisory agencies, performed an analysis to predict the change in floodflow alteration in the Cohoke Creek watershed if the King William Reservoir were constructed. This study was largely based on extrapolations from published data and assumptions made by the project proponents.

Although RRWSG says the proposed King William Reservoir releases would mimic the natural Cohoke Creek flows, in the Environmental Issues Summary, they claim the King William Reservoir will prevent downstream flooding by providing ten times greater flood detention functions than that currently performed by the existing Cohoke Creek wetlands. It should be remembered that flood events, especially in such a sparsely developed watershed like Cohoke Creek, are natural and not only contribute to channel formation and maintenance of riverine systems but also are important in nutrient cycling dynamics, as discussed in Restoration of Aquatic Ecosystems by the National Research Council in 1992 and in the paper entitled "Nature's Pulsing Paradigm" by Odum *et al.* in 1995. By reducing the frequency and duration of flood flows, the proposed King William Reservoir would likely result in additional impacts to downstream portions of Cohoke Creek. Construction of the King William Reservoir might maximize one or a few wetland functions, but overall it appears the project would sacrifice other wetland functions and likely be an overall detriment to the Cohoke Creek watershed. The National Research Council states, "The construction of dams and dredging of river, stream, and the coastal waterways eliminate wetlands at the project site and also affect downstream systems. The stabilization of water levels for rivers or lakes eliminates the vital pulsing function that flooding provides, thus interrupting nutrient and sediment delivery...the natural maintenance and expansion of wetlands often depend on sedimentation events, which are interrupted by dams (long term reduction in sediment load)."

(vii). Landscape Interspersion/Connectivity: This function considers both terrestrial and aquatic habitats and their relationship to one another, but was only superficially addressed in the RRWSG's Mitigation, Program, Fish and Wildlife Mitigation Plan. It is an important function to consider because it attempts to compare the existing Cohoke Creek system with the proposed King William Reservoir from a landscape perspective.

The RRWSG's assessment mainly discussed how periodic logging in the project area has resulted in a fragmented landscape. It seems reasonable to suspect the King William Reservoir proposal precipitated the accelerated logging at the study site, especially by current property owners of the proposed reservoir pool area. Silvicultural activities are common not only in the project area, but throughout Virginia and across the country. Although logging operations often do fragment large forested blocks, in comparison to RRWSG's proposal to backflood a large portion of the Cohoke Creek upper watershed, the influence of logging can be viewed as a relatively temporary impact. Silvicultural activities can and do alter sediment deposition rates, wildlife habitat, TNPP rates, and nutrient cycling; however, they rarely sever such connections as would construction of a dam.

The proposed King William Reservoir would result in the replacement of a diverse wetland-upland complex that spans a continuum from extreme headwaters to higher order stream, with a fairly monotypic open water habitat. Stanford and Ward in Ecology of Regulated Streams emphasize the interconnectivity of a river to its catchment by describing a river as "an expression of the valley through which it flows; production of carbon in lotic habitats is greatly influenced by input of allochthonous nutrients and detritus from the drainage basin."

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The project would not only result in a change in wildlife habitat within the proposed King William Reservoir pool area, but would also result in impacts to downstream portions of the Cohoke Creek system at least to and including the existing Cohoke Millpond (see Section 8 f. (2) (d) for Total Net Primary Productivity, Sediment Retention/Nutrient Assimilation, and Floodflow Alteration). This viewpoint is based on the same reasoning applied by the RRWSG to the existing Cohoke Millpond when they stated the millpond dam prevents “the aquatic productivity of upstream [Cohoke Creek] wetlands from being available to the downstream tidal Pamunkey River system” in the Mitigation Program, Fish and Wildlife Mitigation Plan. In the letter from Newport News dated 27 November 2000 responding to EPA's comments on the Environmental Issues Summary, this same viewpoint was reiterated as “Cohoke Millpond Dam also blocks nutrient and sediment export to the York River Ecosystem and has, therefore, altered the hydrology of Cohoke Creek”; and “sediment and nutrient transport to the Cohoke Tidal Estuary have been cut off for more than a century by an existing dam and impoundment located 3.5 miles downstream of the proposed dam site.” In this same letter, the City of Newport News suggested all the wetland acreage located downstream of the Buckhorn Reservoir in North Carolina could be affected by altered flows resulting from construction of the dam. The World Commission on Dams in a 2000 publication entitled Dams and Development: A New Framework for Decision-making forwards the opinion that more than one dam on a single river could “affect both the physical (first-order) variables such as flow regime and water quality, and the productivity and species composition of different rivers. The problems may be magnified as more large dams are added to a river system, resulting in an increased cumulative loss of natural resources, habitat quality, environmental sustainability and ecosystem integrity.”

In the Mitigation Program, Fish and Wildlife Plan, the RRWSG claims that the proposed wetland mitigation sites would re-establish connections to existing wetlands and riparian corridors, and that these would be preserved in perpetuity. Although the preservation of the mitigation sites and associated buffers in perpetuity has merit in retaining landscape connections over the long term, the diversity of created/restored wetlands is low and out-of-kind with those at Cohoke Creek. The majority of the proposed wetland compensation sites are designed to be depressional wetlands with one or more water control structures (water conveyance channels).

(viii.) Uniqueness: The letter from the City of Newport News dated 27 November 2000 in response to EPA's comments on the Environmental Issues Summary refers to the Cohoke Creek wetlands as not being unique in any way, and not even being a good example of a Coastal Plain forested riparian system. This is contrary to RRWSG's own WET study that documented “the King William AA [Assessment Area] received a high ranking [in Uniqueness/Heritage] due to it representing most or all of this wetland system type within the watershed and due to the AA being located in a pristine area.” The RRWSG's reptile and amphibian study by Mitchell in 1994 states “The lack of rare species in the Cohoke Mill Creek watershed does not mean that the area is unimportant herpetologically. On the contrary, this system of wetlands harbors a rich diversity of amphibians and reptiles. The relatively pristine nature of the wetlands in and associated with the creek insures that numerous species requiring water for some part of their life cycle will occur there. The list of species...demonstrates that the fauna is healthy.” In a letter dated 23 August 1996, the Service noted “wetland habitats our sampling team found the most impressive were often the most inaccessible. The true ecological diversity of the site cannot be experienced from the few road crossings or easy access roads used by the Service for our initial review of the Cohoke Creek site....sampling team observed an extremely diverse array of macroinvertebrates in the wetland complex. The Cohoke Creek reservoir site is a unique resource within Virginia's lower peninsula.” District staff spent quite a bit of time in the Cohoke Creek valley verifying the cover type mapping and collecting data

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for the HEP analysis. District staff strongly disagrees with the RRWSG's current interpretation that the existing study area does not represent a good example of a Coastal Plain forested riparian system.

As discussed above, the accelerated logging in the project area was likely due, in part, to the King William Reservoir proposal. Private owners of land within the proposed pool area would understandably be interested in harvesting the timber that otherwise would be lost due to backflooding if the project was ever authorized. Regardless, from a long-term perspective this is a relatively temporary impact. The mature Cohoke Creek system that existed prior to this last round of logging had not been a virgin forest stand, but rather was a stand that regenerated from a previous harvest.

Regarding the EPW and WET uniqueness variable, the project area wetlands are unique in that they represent the bulk of the upper headwaters of Cohoke Creek. The majority of the functional assessments for the project have demonstrated that these wetlands provide services to the Cohoke watershed that cannot be replaced either by the proposed King William Reservoir or the proposed offsite compensation.

(ix.) Summary of Functional Assessments: The minutes of the 2 August 1995 wetland mitigation workshop recorded by the RRWSG note that the District emphasized "assessment of [wetland] functional value must go beyond the boundaries of the wetlands; likewise, the mitigation program needs to go beyond wetlands." According to the 1990 MOA between the Corps and EPA, the primary goal of wetland mitigation is a minimum of 1 to 1 functional replacement of lost wetland functions. The 2 to 1 wetland acreage compensation goal was identified early on as a interim goal to be used since the HEP and wetland mitigation teams were working concurrently. The RRWSG has been well aware of the primary wetland compensation goal throughout the evaluation of the King William Reservoir project, but has continued to focus on the interim ratio of 2 to 1 wetland replacement even after the functional assessments demonstrated that there would be a net loss of wetland functions.

A review of the functional assessment methods shows that the overall King William Reservoir project (proposed reservoir and mitigation sites) would not fully compensate for lost wetland functions, but rather would result in a net loss of wetland functions (e.g., wildlife habitat, total net primary productivity and support to the downstream wetlands as related to floodflow alteration, nutrient assimilation, sediment retention, etc.). Based on flawed assumptions, the WET analysis was only performed on the Cohoke Creek wetlands in the proposed King William Reservoir pool area, and was not used to evaluate the reservoir or proposed wetland compensation sites. The WET was originally performed for use in making broad brush comparisons of different reservoir alternatives, but RRWSG has since sought to interpret the WET results well beyond the assumptions of the original assessment. The EPW assessment, also based on flawed assumptions, was only successful in emphasizing the fact that the Cohoke Creek wetlands and the proposed wetland compensation sites belong to different wetland classes and hence provide different wetland functions. The HEP study clearly demonstrated that the overall King William Reservoir project would not provide full in-kind compensation for either wetland or upland habitat losses in the King William Reservoir project area. Again, this highlights how the overall King William Reservoir project fails to address the functional loss of a diverse, self-sustaining riverine wetland system. The TNPP study, although based on some erroneous assumptions, demonstrates the overall King William Reservoir project would result in a net reduction of TNPP both within the proposed King William Reservoir pool area as well as downstream reaches of Cohoke Creek. The Sediment Retention and Nutrient Assimilation desktop reviews simply predict that a few wetland functions could be maximized with construction of the King William Reservoir, but to the overall detriment of the remaining Cohoke Creek system by eliminating other important functions (i. e., King William Reservoir would sever TNPP, nutrient, and

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sediment connections between the headwaters and downstream reaches of Cohoke Creek). Replacing a heterogeneous wetland/upland riverine system complex with a large homogenous impoundment would undoubtedly result in a reduction of Landscape Interspersion/Connectivity functions. (A more detailed discussion of the various functional assessments can be found in the Functional Assessments Section of the Norfolk District's report entitled "Analysis of wetland and habitat impacts and the Regional Raw Water Study Group's proposed compensation for the proposed King William Reservoir.")

(e) Applicant's Compensation Proposals:

(i.) Mitigation: The Council on Environmental Quality has defined mitigation in its regulations at 40 CFR 1508.20 to include: avoiding impacts, minimizing impacts, rectifying impacts, reducing impacts over time, and compensating for impacts. In regard to wetland mitigation, the 1990 Corps/EPA Mitigation MOA requires a sequential review whereby project proponents must first demonstrate avoidance of wetland impacts, then steps taken to minimize wetland impacts, and finally how unavoidable wetland impacts will be compensated. While compensatory mitigation for wetland losses must be planned and considered in the evaluation of a permit application, even complete wetland compensation would not override the sequencing process in determining whether a project would not be contrary to the public interest. If there is no demonstrated need for the loss, then the loss is avoidable and no amount of wetland mitigation can compensate for the loss. Wetland losses must first be avoided, then minimized and finally unavoidable wetland losses must be mitigated. The District's assessment focuses on compensatory mitigation for anticipated wetland impacts that would result from construction of the proposed King William Reservoir. The May 1999 Final Wetland Mitigation Plan indicates that the King William Reservoir project was selected by the RRWSG as the least damaging, practicable alternative. The RRWSG claims this choice was based on the process of the Environmental Protection Agency's 404 (b)(1) Guidelines. However, only the Corps makes the decision as to what constitutes the least environmentally damaging, practicable alternative at the end of the permit evaluation. The applicant cannot make that determination. Avoidance and minimization need to be demonstrated first; however, the applicant's compensation proposals needed to be reviewed by the District so a determination could be made as to whether the compensation proposals could offset the losses. Evaluation of steps taken to avoid and minimize wetland impacts are addressed elsewhere in this document.

(ii.) Mitigation Team: An interagency team was formed in 1997 to evaluate and provide guidance on a wetland mitigation plan to be developed by the RRWSG to compensate for the proposed wetland impacts that would result from the construction of the King William Reservoir. The team was comprised of representatives of the Norfolk District, EPA, the U. S. Fish and Wildlife Service, Christopher Newport University (under contract with the EPA), Virginia Department of Environmental Quality - Water Division, Newport News Waterworks, and Malcolm Pirnie, Inc. In a letter dated 3 September 1998, the City of Newport News notified the District that they had retained Southern Tier Consulting and Environmental Specialties Group to assist them with the mitigation effort, and that Environmental Specialties Group would replace Malcolm Pirnie as the leader of their mitigation team.

The interagency mitigation team was assembled to review possible compensatory mitigation strategies in conjunction with reviewing other facets of the proposed reservoir project. As part of the review process, the RRWSG needed to show they could find 806 acres of compensatory wetland mitigation. Because finding 806 acres of compensatory mitigation is not an easy task, the team worked to review the sites to determine if they were feasible for wetland creation. Some sites were preliminarily reviewed and found

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not to be acceptable. Other sites have been studied in more detail and the information has been provided in the “King William Reservoir Project Final Wetland Mitigation Plan” dated May 1999, by the RRWSG.

Generally, the Corps prefers onsite compensation sites. However, onsite restoration and creation areas were not available due to steep topography, high elevations, and the lack of available prior converted (PC) farmlands. Therefore, the consultants looked offsite using a screening process for identifying potential mitigation sites. The consultants reviewed sites which contained the following: large acreage for potential wetland development, hydric soils, sources of hydrology, proximity to existing wetlands and streams, suitable landscape position, and site access. In general, priority was to be given to potential wetland restoration (e.g., prior converted cropland) rather than wetland creation sites, which may require extensive site manipulation. The Mitigation Team tried to ensure that creation was not forced onto a marginal site. Also, an effort was made to evaluate the sites so as not to maximize wetland restoration/creation acreage past that which the landscape position of the specific site could support. The mitigation effort for this stage of the project was mainly driven by the acreage goal to meet the 2 to 1 ratio requirement and to match cover type and hydrologic regime.

(iii.) August 1996 Conceptual Mitigation Plan: A Conceptual Mitigation Plan was developed solely by the project proponents without interagency input and submitted to the District for review in August 1996. This document contained the assumptions and findings of the Evaluation of Planned Wetlands (EPW) functional assessment, which was not accepted by the District or other agencies (see Functional Assessments, above). The report was prepared largely to provide the Virginia Department of Environmental Quality with a conceptual mitigation plan for their permit review process. The plan was developed prior to the formation of the Mitigation Team and proposed 590 acres of compensation on sites which had not been reviewed by the District and the agencies. The plan identified 12 sites, 7 of which are still proposed as primary mitigation sites in the final mitigation plan.

Early on, the RRWSG claimed that their unfinished plan met the 2 to 1 replacement goal and could fully compensate for the losses of the large wetland system in the Cohoke Valley. The August 1996 Plan states, “This plan is generous and demonstrates that the project’s wetland impacts will be more than offset by compensatory mitigation projects.” However, the 1996 plan had not been determined to meet the required goal of 2 to 1 replacement of lost acreage, because the RRWSG had not yet even identified 510 acres of the compensation plan for review by the District or the agencies.

(iv.) Pilot Study: The concept of a Pilot Study was formulated in a 17 April 1997 Mitigation Team meeting to demonstrate the level of design detail needed for each of the wetland mitigation sites. The Pilot Study produced detailed water budget information for Meadow Farm Site C; however, the agencies were still concerned about suitable hydrology for that site and others. To remedy these concerns, the Mitigation Team came to a consensus agreement that if the project were permitted, a few of the more questionable and problematic mitigation sites would be constructed prior to any work being conducted in wetlands at the impact site. Up-front construction of these wetland mitigation sites would help test the validity of the water budgets and other assumptions made in the mitigation plans.

(v.) October 1997 Draft Mitigation Plan: The RRWSG submitted a Draft Mitigation Plan in October 1997. This plan was the applicant’s first version of a compensation plan with interagency input. However, the RRWSG prematurely released the October 1997 Plan to the public with claims of full in-kind replacement. During a 13 November 1997 Mitigation Team meeting, the District staff informed the RRWSG that they should not claim to fully compensate for all the impacts if they could not substantiate

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such a claim. In a 24 November 1997 letter to the RRWSG, the District reiterated that the October 1997 Plan did not meet the goal of “no net loss” of wetlands. The Plan was incomplete and could not claim full in-kind functional replacement, since the HEP study and other assessment methods were not finished. The District recommended the RRWSG withdraw the report and resubmit it when the HEP and mitigation reviews were complete. The RRWSG agreed to continue to work with the Mitigation Team and submit a complete report at a later date.

During an 8 December 1997 meeting of the District and the advisory agencies, a consensus was reached concerning the primary goal of the mitigation plan and the use of the HEP study. The wetland mitigation plan should strive to replace other wetland functions that would be lost in addition to wildlife habitat losses. The mitigation scenarios, that would be used to replace the habitat units lost, would be evaluated by the mitigation team to determine which scenarios could provide the most beneficial wetland functions. In a letter dated 28 May 1998, EPA concurred with the Service’s approach of maintaining the 2 to 1 ratio of wetland replacement while using the HEP as a guide to design feasible wetland sites.

(vi.) Fringe Study: The Fringe Study was completed by the RRWSG in an attempt to justify the use of potential fringe area around the reservoir as wetland mitigation. The project proponents performed this study without the benefit of input or concurrence on assumptions by the District or any advisory agencies. This study attempted to examine the abiotic factors that influence the development of potential fringe wetlands based on evaluation of several existing “reference reservoirs” in the Hampton Roads area during the summer of 1996. Using this information, Malcolm Pirnie extrapolated the expected extent of fringe wetland development at the proposed King William Reservoir at future time intervals. During a 28 August 1997 Mitigation Team meeting and in a 29 September 1997 memo, the District provided detailed comments on the Fringe Study; however, these comments were not addressed in the RRWSG’s final version of the study that was circulated in October, 1997. Since the concerns of the District and other agencies were not adequately addressed, the assumptions and findings of the Fringe Study have been rejected. The HEP team gave suitable habitat credit to the proposed King William Reservoir lakeshore with its bordering vegetated buffer and unvegetated shallow water areas.

The District’s problems with the use of the projected wetland fringe acreage as wetland compensation stem from the difficulty in quantifying the amount of wetland fringe that would potentially develop, the long-term sustainability of the fringe, and the fact that any fringe wetland development would be out-of-kind. The report draws conclusions on wetland succession based on field observations of existing reservoirs of different age classes made during a single growing season. However, the report did not distinguish field observations of persistent wetland communities that were present before construction of the reservoirs from wetland communities newly established after the reservoirs were constructed. This may lead to erroneous predictions on wetland fringe succession, particularly as it relates to the predicted depths that the different wetland classes may colonize over time. This is especially applicable to the proposed King William Reservoir, which would result in the loss of virtually all wetlands located upstream of the proposed dam.

The Service commented on the use of the fringe to provide some habitat benefit that could be evaluated using HEP, but indicated that the predicted acreage provided in the Fringe Study did not appear to be justified. The Service was opposed to using the potentially developing fringe area as compensation for wetland impacts, but agreed to using the fringe for habitat compensation. Also, in their August 1997 memo, EPA stated “incidental fringe development will not be accepted by EPA as wetland compensation for wetland losses incurred as the result of inundation. The unpredictability of wetland development,

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coupled with the frequency and duration of drawdowns at the reservoir will not provide assurance of success.”

(vii.) July 1998 Draft Mitigation Plan: The concept of the RRWSG submitting a working document was discussed during the 27 and 28 May 1998 Mitigation Team meetings. During the meeting the link between the HEP Study and the mitigation plan was again discussed. The District and the agencies highly encouraged the RRWSG to finalize the HEP prior to submitting a mitigation plan. The Mitigation Team met on 26 June 1998 and discussed the need for in-kind replacement of the wetlands that would be lost and the problem of replacing the riverine wetlands with depressional wetlands that may not be as productive. The Team also listed the functions of the existing wetlands and commented on the loss of riverine systems. The projected total acreage for the proposed sites was also examined.

The RRWSG submitted a Working Draft Mitigation Plan in July 1998 to the District and the agencies. The plan was submitted as a working document; otherwise it would have been sent to the agencies for official comment. The District staff and the agencies felt that almost all of the potential wetland mitigation acreage for each site had been overestimated. Overall, the proposal in the July 1998 plan fell short of the 2 to 1 goal by over 200 acres. Contingency measures included use of sites that had not been approved. In addition, the plan proposed that “If some, or portions of some of the proposed 785 acres of wetland restoration and creation are not feasible following final design, fringe wetlands will make up any differences to provide the 2:1 acreage.” The District and the agencies had previously indicated several times that the potential fringe development could not be used as wetland compensation.

The plan also offered a proposal for preservation of existing marshes to meet the 2 to 1 compensation goal. While the District and the agencies agreed the proposed preservation areas contained pristine marshes, the use of preservation to compensate for the proposed losses in the Cohoke system was not acceptable. In addition, the Virginia Department of Environmental Quality’s permit specified a mitigation compensation package of no less than 2 to 1 creation/restoration. Therefore, the state permit would have to be modified if a significantly different mitigation scenario was utilized.

In the 1998 plan, like others, the RRWSG claimed that the mitigation plan, “when successfully implemented, will fully compensate for wetland losses that would result from the proposed King William Reservoir.” Due to many concerns with the proposed sites and the estimated acreages, the plan was deemed by the District staff to be incomplete.

(viii.) February 1999 Final Revised Draft Mitigation Plan: In February 1999, Environmental Specialties Group submitted the Final Revised Draft Mitigation Plan on behalf of the RRWSG. In this plan, the RRWSG claimed there would be no net loss of wetland function and value, and they stated there would be a net environmental gain as a result of implementing the strategies they had outlined. However, the functional assessments did not support these claims.

The February 1999 Plan was the first time sites outside of the immediate watershed had been added to the mitigation plan. Because the RRWSG indicated that they had exhausted all opportunities in the York River Watershed, the RRWSG set their focus on the Rappahannock Watershed to find additional acreage. EPA questioned whether the RRWSG had exhausted all options in the York River Watershed because the RRWSG discussed acquiring mitigation sites via condemnation. In their February 1999 memo to the District, EPA was “concerned that the February 1999 Plan makes reference to the fact that the City of Newport News has made the determination that it is willing to consider condemnation to acquire

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beneficial mitigation sites. If this is true, it raises the question of allowing the RRWSG to move outside the watershed of the York River Basin to investigate mitigation sites. EPA predicated the decision to move outside the watershed for mitigation on the fact that Newport News had exhausted all feasible sites within the York basin and would not pursue condemnation of property to acquire sites for mitigation. This is an important issue and one that needs to be discussed before EPA considers the additional sites included in the February 1999 Plan as feasible.”

In the February 1999 memo, EPA also expressed concerns about the mitigation process. The Mitigation Team had a systematic approach to reviewing the proposed sites and the process had been disrupted by a change in consulting firms. EPA was particularly distressed that “the February 1999 Plan, while including previously agreed upon sites and particular design elements, has included significant changes in compensation acreage without the appropriate data to support such changes.” The acreage of potential mitigation on half of the sites had been substantially increased without the District’s and the agencies’ agreement. The Mitigation Team had previously reached a consensus of the acreage figures for the proposed sites during a January 1998 meeting. EPA expressed their concern for providing “additional wetland acreage at existing sites by expanding the compensation beyond the footprint of hydric soils.” No additional documentation was offered by RRWSG to support the changes. EPA stressed that the approach “may result in wetland development which would not be appropriate for the landscape or may result in failure to create wetlands at all.” Given their concerns about the February 1999 Mitigation Plan, EPA objected to the plan because it would not “provide the optimal means of mimicking the values and functions of the wetlands lost at Cohoke Mill Creek.”

(ix.) May 1999 King William Reservoir Project - Final Mitigation Plan: On 27 May 1999, the Final Wetland Mitigation Plan was submitted by Environmental Specialties Group with input from Malcolm Pirnie. Conceptual design plans were included in the May 1999 plan. The Final Plan focused on achieving needed acreage to meet 2 to 1 wetland replacement. However, it was recognized that the final acreage needed could increase depending on the results of the ongoing functional assessments.

In the Final Mitigation Plan, the RRWSG expressed their opinion that the acreage required could even be reduced below the 2 to 1 ratio and still meet the goal of no net loss of wetland function. They quote Kruczynski’s 1989 paper entitled “Mitigation and the Section 404 Program: A Perspective”, in which he indicates that ratios can be lowered where the mitigation is in place prior to the impacts. In that paper, Kruczynski clarifies that those ratios “are suggested for on-site, type-for-type (in-kind) replacement mitigation.” In addition, his suggestions were generally directed to wetland restoration. A large portion of many of the King William Mitigation sites would be considered creation. For wetland creation, he indicated that “Increasing the ratio to 2 to 1 can be justified on the basis of the greater risk associated with any particular site.” The Lanesville and Meadow Farm Site B both contain farmed wetlands. Typically, credit for enhancement would be given at even higher ratios, due to the fact that some wetland functions are currently present. Kruczynski notes that for enhancement “There is a risk that although some functions will be improved other currently existing functions could be degraded. Due to this uncertainty, a 3 to 1 mitigation should be required on an acre-for-acre basis.” The District does not agree that the proposed plan would exceed prescribed ratios and go far beyond achieving no net loss of functions and values as stated in the Final Mitigation Plan. I have determined that if all of the primary sites and some of the contingency sites are completely successful, the applicant’s Mitigation Plan would provide no net loss of acreage and some wetland functions, but has not been demonstrated to fully compensate for all functions of the existing Cohoke Creek system.

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Comments from the Service and EPA came at the time when the need for the projected amount of water was being re-evaluated by the District based on the findings of reviews conducted by the Institute for Water Resources. In the Service's 22 July 1999 letter and EPA's 5 August 1999 letter to the District, both agencies conveyed their belief that the sequencing process of mitigation had not been completed due to the possibility of an existing less damaging alternative. EPA only provided general comments on the Final Mitigation Plan, and requested the opportunity to comment in more detail if in the future new information supported issuance of a permit for the reservoir as the least environmentally damaging practicable alternative. EPA stressed the importance of recognizing "the diverse wetland communities present may be extremely difficult, if not impossible, to adequately replace." EPA also maintained their opinion that the Cohoke wetlands qualify as an Aquatic Resource of National Importance (ARNI) due to the diverse type, quantity and functional capacity. The basis for the determination is found in Part IV 3(a) of the Clean Water Act Section 404(q) Memorandum of Agreement between EPA and the Department of Army.

The Service also expressed concern for replacing a "stream valley wetland complex driven by a groundwater/surface interface" with farm fields that have depressional surface water regimes. The Service believes the proposed mitigation is hydrologically and ecologically "out-of-kind." Even though the created wetlands would be of the same cover types according to the Cowardin classification as the existing wetlands, the Service indicated those areas would not have the same sources of hydrology which affect the functions of the system. The landscape positions of the proposed mitigation sites do not mimic that of the Cohoke Valley stream complex. The plan attempts to take pieces of land that are adjacent to streams and rivers and perch water to create wetlands or restore cropland back to its former wetland status. Most of the proposed mitigation sites would be predominantly precipitation driven with a few having unquantified groundwater inputs. The Cohoke Valley contains flow-through wetlands that absorb and export nutrients, retain and transport sediments, and retain flood waters as they pass through the system and provide habitat to species that thrive in these slow moving stream valleys. The proposed sites may be adjacent to streams or have streams on the property, but the proposals do not restore stream valley complexes as claimed by Newport News in their 28 November 2000 letter.

In their 22 July 1999 letter, the Service expressed concerns over the sustainability of off-site hydrology for the mitigation sites. Previously, District staff raised the issue of sustaining long-term hydrology of some sites in comments dated 29 July 1997 in response to the Pilot Study. The District and the agencies were concerned about changes in land use over time, which could detrimentally influence the long-term hydrology supporting the mitigation sites. During Mitigation Team meetings, the possibility of the RRWSG obtaining hydrologic easements was discussed. The Service sees this as a serious deficiency in the Plan and has indicated they would object to a Final Wetland Mitigation Plan without a commitment from RRWSG to obtain long-term hydrology rights from off-site sources for certain sites, such as the Townsend and Lanesville sites which heavily rely on surface water runoff as a major source of hydrology. Newport News responded to this issue in their 28 November 2000 letter to the District in which they address the comments on the Final Mitigation Plan. They have indicated their willingness to obtain water rights once the sites have been purchased. However, they feel that in some cases it may not be needed, because major portions of the drainage area are located on the mitigation sites or preservation sites. I agree that it may not be necessary to purchase water rights on all sites, but protection of the watershed would be imperative for the success of some of the sites that rely predominantly on surface water runoff.

Although the RRWSG's Final Mitigation Plan proposed only a 5-year period for monitoring, in their 28 November 2000 letter responding to agency comments, the City of Newport News agreed to the

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recommended 20-year timeframe. Should a permit be issued, the District would work with the applicant to develop an acceptable monitoring plan with specific success criteria should discussions on the mitigation plan resume.

Other concerns about the proposed wetland mitigation plan surround the Taliaferro and Terrell sites in the Rappahannock River watershed. The Mitigation Team conducted a single field visit to each of these sites; however, only preliminary information has been provided for those sites. Together, the two sites provide 235 acres of the proposed mitigation. District staff and agency representatives have not agreed to the viability of the sites because additional water budget information and detailed soils analyses have not been provided. In a 24 May 1999 letter to the District, the Service expressed concerns over the preliminary design plans for the Terrell and Taliaferro sites. The Service provided site-specific comments, which described serious design flaws in the conceptual plans. The Service had provided those comments based on the draft plans; however, in the Service's 22 July 1999 letter, they indicated that the same deficiencies and flaws were present in the Final Mitigation Plan. In their 28 November 2000 letter, the City of Newport News responded to some of the concerns about the Terrell and Taliaferro sites; however, the larger issues with those sites have not been resolved.

Without some assurances that the hydrology would be maintained in the future to sufficiently supply a created wetland, I cannot agree that a fully successful mitigation effort could be achieved. The Service maintains a strong belief that the District should not accept and approve a Final Wetland Mitigation Plan with the existing conceptual plans for the Terrell and Taliaferro sites. In a 6 August 1999 memo, EPA also conveyed similar concerns about the conceptual plans for the Terrell and Taliaferro sites. Because of the outstanding concerns regarding the two sites, EPA believes they should not be included in the Final Wetland Mitigation Plan until the conceptual design plans have been corrected.

An additional problem with the Mitigation Plan is that the use of the proposed mitigation sites has not been secured and some of the sites may not remain feasible. For example, the Bleak Hill/Ferry Farm site has been proposed for a mitigation bank by York River Mitigation Landbank, L.L.C. The District has received a Prospectus for the proposal outlining the intentions of the landowner to create a mitigation bank on the site. The Bleak Hill/Ferry Farm site was estimated as providing 126 acres of the RRWSG's mitigation plan.

Other screening factors, such as the presence of federally listed endangered or threatened species, could affect the use of particular sites or portions of sites or potentially only impose time of year restrictions on the construction work. The Virginia Department of Conservation Recreation's Natural Heritage in a 11 January 1999 letter indicated that federally listed threatened bald eagle nests have been located near Davis Farm and the Borrow Area. According to Natural Heritage the federally listed threatened small whorled pogonia may be present near the Borrow Area. In a January 14, 1999 letter to Environmental Specialties Group, the Virginia Department of Game and Inland Fisheries also indicated bald eagles may be present near the Davis Farm site and Lanesville. Small whorled pogonia plants may also be present at Lanesville. In a 26 January 1999 letter the U. S. Fish and Wildlife Services' Virginia Field Office recommended surveys for the small whorled pogonia on any of the mitigation sites that contained appropriate habitat. The Service also indicated that nests of the great blue heron have been documented near the Island and Rice sites.

In addition, not all of the mitigation sites have been screened for historic resources. It has come to the District staff's attention that the proposed Townsend wetland mitigation site is situated within the

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Marlbourne National Historic Landmark site (National Register Number: 66000837) in Hanover County, Virginia. A 1999 Phase I Survey report submitted by the applicant referenced the Marlbourne National Landmark, but did not indicate that the Townsend Site was within the Landmark boundaries and did not recommend additional surveys. According to the Virginia Department of Historic Resources, additional coordination under Section 106 would be necessary, and the effects of the proposed action on the National Historic Landmark would have to be coordinated with the National Park Service (Personal Communication, March 2001). The Gulasky Site was also reviewed in the 1999 Phase I Survey review. The report indicated that additional historic resource surveys may be necessary depending on the final mitigation plan.

Specific water budget information would be required to design final plans, which would need to be reviewed by District staff and the advisory agencies. Final approval from the District would be required prior to initiation of construction. The District and the federal agencies raised numerous concerns regarding the viability of some of the mitigation sites, based on such variables as landscape position, contributing watershed for supporting hydrology, soil permeability, etc. Based on those concerns, RRWSG proposed to construct three mitigation sites as demonstration projects prior to or concurrent with construction of the dam. The three sites determined to be the most problematic by the mitigation team consists of the Townsend site, Meadow Farm site B and Meadow Farm site C. Lessons learned from the demonstration projects would be applied to the remaining sites. The following is a brief description of each mitigation site in the Final Plan, with some of the District's concerns noted (see Map 5 - Wetland Mitigation Site Locations).

Bleak Hill /Ferry Farm

This site is located adjacent to the Pamunkey River and consists of 126 acres, which have been divided into three sections for the mitigation plan. Even though this appears to be a suitable site to the District and the federal agencies, it is recognized that Sites B and C will involve some earthwork and a water conveyance channel, which makes success of the design riskier. The hydrology would be supplied by stormwater runoff. The landscape position of the site is ideal; however, the wetlands would be depressional and would not be replacing the functions of the lost system. As noted above, this site has been proposed for a mitigation bank.

Burlington Farm

The 14-acre farm site would involve creation and restoration of wetlands. Although the site is small it does contribute to the overall Mitigation Plan, since it drains to the Meadow Farm Site and a corridor between the two sites could be protected. The tributary on the site flows to the Mattaponi River. The existing ditches on the site would be filled to allow water to disperse across the site. Minor earthwork would occur and a water conveyance channel would be installed. Most of the area is underlain by hydric soils. Burlington Farm would contain only slope and depressional type wetlands that would not replace the functions of the impacted system.

Davis Site

The plan for the Davis Site, which drains to the York River, is to restore/create 12 acres of wetlands in the existing farm field. The majority of the work would be creation, since hydric soils are only around the existing wetlands. Grading would be required to create wetlands, which would be supported by a relatively small drainage basin. The hydrology would be supported by runoff and precipitation. Protection of the drainage basin may be necessary to ensure long-term success of the wetlands. The

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wetlands would be created along a stream channel, but would be depressional for the most part and would not replace the function of the impacted system.

Gulasky

The Mitigation Plan includes restoration/creation of 33 acres of wetlands on this site, which drain to the Pamunkey River. No perennial or intermittent streams flow onto the site; therefore, the hydrology relies on runoff from the drainage area and precipitation. The slope wetlands would be created by installing small berms to hold the water on the site. The District had some concerns regarding the cross-sectional drawings, which show upland at elevation 56 and wetlands at elevation 59. This seems to be creation of a perched wetland that may not be sustainable in the long-term. For Site B the plan calls for installing a 12-inch berm, which would go through existing wetlands on the south side of a ditch. Further review of the necessity of placing a berm in existing wetlands would be needed. The plan calls for cutting and filling in other areas to create the slope wetlands, which would not replace the functions of the impacted wetlands.

Island Site

The landscape position of this site is very favorable, since it is surrounded by existing wetlands. The major concern on this site is that too much creation would be forced onto a site that cannot support that much wetland creation. The plan calls for creation of 79 acres of wetlands along existing wetlands and drainageways. The source of hydrology is intercepted stormflow from Moncuin Creek and precipitation. The predominance of non-hydric soils within the proposed wetland area would need to be overcome by adding organics. Creation of wetlands here may be risky, but the benefits are taking the site out of farm production and preserving the wetlands and uplands. The existing road into the site acts as a dam and could potentially affect the hydrology of the site. This would need to be further investigated. The Island Site would provide some wetlands, which would have a riverine component; otherwise they would be classified as depressional. This site has a favorable landscape setting; however, it would be important not to force wetlands into inappropriate areas on this natural upland island.

King William Sand and Gravel Site

The 38-acre farm field would be restored and created into wetlands that would provide some riparian habitat to the Mattaponi River. The hydrology would be from surface water flows, so concern is for protection of the drainage basin and future land uses. The proposed restoration/creation areas include both hydric and non-hydric soils. Hydric soils are only found in the northern portion of the site, next to the existing wetlands. The plan calls for adding small berms to capture and hold water on the site longer. The site has a great deal of potential, but the District does question whether wetlands would be established up to elevation 48. Water from the intermittent drainage would be routed to enter the mitigation site and the drainage ditch in the center of the field would be filled. The wetlands created on the site would be slope and riverine which would be similar to the impacted wetlands. Although the site is adjacent to Boot Swamp Creek, the design does not include diversion of water away from the creek. The wetlands would flow into that creek further downstream.

Lanesville

The Lanesville site contains 33 acres of farm field that would be restored/created into wetlands that would drain to a tributary of the Pamunkey River. The hydrology would be a function of direct precipitation, surface water runoff, and groundwater seepage. The main source of hydrology would be surface water flow. Since the majority of the drainage area is offsite, there is concern about a viable long-term source of hydrology. The wetlands creation/restoration would be completed by filling the existing shallow ditches and installing a 2-foot rise along one side of the property to hold water on the site. Most of the

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creation/restoration area contains hydric soils. In fact, a portion of the area along the slope already contains hydrophytic vegetation and would be considered farmed wetland pasture. The District would have concerns with the proposal to create wetlands at elevation 40 adjacent to existing uplands at elevation 34 as it would create a perched system. In addition, wetlands with a seasonally flooded regime are proposed to be created in that perched area that is underlain by mostly non-hydric soils. Some work would need to be done on this plan to show that creation of 33 acres is feasible. Slope and depressional wetlands would be created, so this site would not replace the functions of the riverine wetlands found in the Cohoke Creek system.

Meadow Farm A

This site is located immediately adjacent to the Mattaponi River. It contains 71 acres of farm field, an open water pond, forested wetlands and forested uplands. Farmed wetlands are present on this site adjacent to the pond. There is a natural levee between the site and the River. The hydrology would be based on surface water flow. The perennial stream adjacent to the site would also be diverted to provide water as sheet flow across the site. The 21-acre farm field would be converted to wetlands, the existing pond would remain unchanged, and some upland restoration would occur. Since farmed wetlands are present on a large portion of the field, that area would actually be enhancement. Excavation would create a depressional landscape fed by surface water flow and precipitation, so these wetlands would not replace the functions of the impacted wetlands.

Meadow Farm B

The proposal for this site involves converting an abandoned sand and gravel mining site into wetlands along the Mattaponi River. Wetlands in this landscape position could provide some riparian habitat and water quality benefits. Careful consideration would need to be given to soil amenities, since previously mined areas often contain very sterile conditions. The hydrology would be based on a seasonal high water table and some surface flow. This system would be connected to the Mattaponi River and would have more of an opportunity to become naturalized than the proposed borrow area, which was not favorable to the District or the agencies. The mined areas would be filled up to wetland elevations creating approximately 57 acres of depressional wetlands unlike the impacted wetlands.

Meadow Farm C

This site consists of 169 acres of pasture and cropland, and the majority of the fields are underlain by hydric soils. The landowner modified the hydrology by installing ditches and some drain tile. The plan calls for capturing surface water and holding it on the site for prolonged periods. The long-term availability of hydrologic inputs from the drainage area of this site would be a concern, since the wetland mitigation site would be supported by surface runoff and precipitation. Approximately 30 acres of the site contains hydric soils and only minor earthwork would be required to accomplish the restoration. The other 43 acres does contain hydric soils, but grading has been proposed to create wetlands on this part of the site. The proposed elevations of the water conveyance may be problematic. The proposal on the east side of the site shows a perched wetland at elevation 52 and there are existing uplands at elevation 40. The plan calls for filling a slope from elevation 40 to 52 and installing a reinforced water conveyance channel creating a perched wetland system. Approximately 73 acres of depressional wetlands would be created. The created wetlands would not replace the functions of the lost wetlands. Several District and agency team members had concerns over the proposal for this site, so the RRWSG agreed that it would be constructed first as a demonstration project.

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Rice Site

The Rice Site consists of 33 acres of farmland that would be converted to wetlands. Almost all of the soils in the farmed area are non-hydric, so this would be considered creation. The hydrology would be supported by surface flow and precipitation. The site has a small watershed consisting of existing farmland. This could be a concern if the drainage area was developed and stormwater was routed away from the site. The plan calls for matching the elevations of the Pamunkey River floodplain, which is immediately adjacent to the site. The created wetlands would connect to existing floodplain. Even though this site is small and would contain creation, the landscape position across the Pamunkey River from the Island Site makes it favorable. Approximately 33 acres of riverine wetlands, which are similar to the impacted wetlands, would be created.

Taliaferro Site

A 42-acre farm field would be converted to wetlands and 3 acres of existing forest would be hydrated to restore/create wetlands in the Rappahannock River watershed. The site contains hydric soils and has been ditched to facilitate drainage. The hydrology would be supported by surface flow and direct precipitation. The existing swales and ditches would be backfilled to restore wetland hydrology to the field. The District concurs with the Service's concerns about the plans showing a water conveyance channel at elevation 28.5 and wetlands at elevation 30.5. Without additional information, it would be difficult to determine if that proposal is feasible. The majority of the watershed contributing to the hydrology is offsite and future development could have an effect on the long-term sustainability of the wetlands. The wetlands that would be restored would be considered depressional and would not replace the lost functions of the Cohoke wetlands.

Terrell Site

The 300-acre tract is currently open farmland off Route 17 in the Rappahannock River basin. The agencies and the District do not agree with the RRWSG that the site could support creation/restoration of 300 acres of wetlands. A somewhat tentative consensus was reached for 190 acres of creation/restoration. The hydrology would be based on surface runoff from surrounding sites and an offsite pond that flows into the site. The future use of the pond and the contributing watershed would be a concern, since this water is needed to support the hydrology of the wetland mitigation area. The existing ditches would be filled and a berm would be installed along the northern edges of the site to hold water for longer durations. Rough areas and depression would also be added for diversity to this surface water site. A large portion of the site contains hydric soils and the plan does not propose any major grading. The lower and middle portions of the site seem to be the most promising. The upper areas, closest to Route 17 appear to be more problematic. The District finds potential for restoration of wetlands on the site, but fears that the hydrology may not support a larger acreage. Depressional wetlands, that would not replace the functions of the Cohoke wetlands, would be created on the site.

Townsend Site

This site consists of 90 acres of farmland that would be restored/created into wetlands. Part of the site drains to a tributary to Totopotomoy Creek and the other part flows under Route 360 to a pond that discharges to the Pamunkey River. The hydrology would be supplied by surface flows and direct precipitation. The plan calls for backfilling the existing drainage ditches and installing water conveyance channels. The proposal involves only minor earthwork and a large part of the site is underlain by hydric soils. One concern for this site would be the lack of control over the drainage area, especially since it is along the Route 360-corridor. Some of the proposed elevations on the cross section also would need to be further reviewed to determine if they are feasible. The Townsend site would produce slope and

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depressional wetlands, which would not replace the functions of the impacted wetlands. As noted previously, there are additional historic resource concerns surrounding this site.

Contingency Sites

Although the Mitigation Team has not reviewed the Hollyfield Farm, Chericoke Farm or the Wood Farm Sites, it appears on cursory review that they may have potential for wetlands restoration/creation. These sites contain large acreages of hydric soils and they drain to the Pamunkey River. Additional acreages at primary sites were also included as contingency acreage. While the District has not agreed that additional acreages would be feasible, any additional acreages achieved would be considered if a permit for the reservoir project was issued.

The Mitigation plan could fall short by as much as 431 acres due to the uncertain feasibility of the 90-acre Townsend site, problems with the designs of Terrell and Taliaferro (combined acreage of 232), and due to changes in the conceptual plans that appeared in the Final Wetland Mitigation Plan, for Gulasky, Lanesville, and Meadow Farm C (an additional 109 acres). The Townsend Site is potentially located within a national historic landmark and its use may be limited. Additional problems with the designs and water budgets of the Terrell and Taliaferro Sites have been identified by the District and the agencies. The plans for these two sites are not acceptable as submitted, and additional field work would probably be needed to develop suitable wetland restoration/creation designs. During the field visits the District and the agencies agreed that opportunity exists for wetland creation/restoration on the proposed sites in the Final plan; however, the District and the agencies do not agree with all aspects of the conceptual plans.

The District staff believes that the proposed sites included in the Final Mitigation Plan are acceptable as compensatory mitigation sites; however, the wetlands created would not replace the functions of the wetlands that would be impacted. In addition, the applicant altered the design plans submitted in the Final Plan from those previously submitted. The changes to the design plans have caused my staff additional concerns over the sustainability of the proposed wetland creation.

(x.) Mitigation Program, Fish and Wildlife Mitigation Plan: On 06 October 1999, Malcolm Pirnie submitted the Mitigation Program, Fish and Wildlife Mitigation Plan for the RRWSG. The purpose of the report was to tie together all aspects of the mitigation proposals including the functional assessments and the stream restoration. The plan summarized the acreage of mitigation proposed including the upland buffer areas, which are part of the mitigation sites. In most cases, the RRWSG would be required by existing landowners to purchase whole parcels including upland. The remaining upland would act as buffers to the created wetlands.

One of the shortcomings of this report was that a great deal of the information it contained was based on studies, such as the Fringe Report, that had been rejected by the District and the agencies. Also, the functional assessments, WET and EPW were performed without input from the federal agencies and several of the assumptions made for the methodologies were seriously flawed (see Functional Assessments, 8 f. (2) (d) above). The Mitigation Program, Fish and Wildlife Mitigation Plan indicates valuable shoreline wetlands and shallow water habitat are expected to develop around the proposed reservoir. These potential wetland areas were not included as mitigation due to the fluctuating water level in the proposed reservoir, the steep slopes down to the water's edge and the questionable nature of their development and sustainability.

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The report also addressed other forms of mitigation. One section discussed support to the Pamunkey and Mattaponi Indian Tribes for the fish hatcheries on the Tribal Reservations. This type of mitigation cannot be used as compensation for wetland impacts, but may be evaluated for other public interest review factors.

The Mitigation Program, Fish and Wildlife Mitigation Plan indicates that the Wetland Mitigation Plan exceeds the District's wetland compensation requirements by 137 acres. The difference in acreage is based on a full 2 to 1 ratio versus a 1 to 1 ratio for emergent impacts and a 1.5 to 1 ratio for scrub-shrub impacts. The RRWSG's Final Wetland Mitigation Plan includes 806 acres of potential restoration and creation of wetlands to meet the 2 to 1 ratio generally required by the District for forested wetland impacts. The Norfolk District Regulatory guidance on mitigation ratios provides compensation ranges between 0.5 to 1 and 1.5 to 1 for emergent wetland impacts, between 1 to 1 and 2 to 1 for scrub-shrub wetland impacts, and between 1.5 to 1 and 2 to 1 for forested wetland impacts. The guidance also states "in any specific case the appropriate ratio can vary from zero to infinity...based solely on the functions and values of the aquatic resources that will be impacted." Originally the RRWSG had proposed a 1 to 1 ratio for all the impacts, including impacts to the forested wetlands. The District indicated that 1 to 1 was not acceptable and that a 2 to 1 ratio for the impacts would be needed to even begin to offset the impacts to the Cohoke wetland complex. Utilizing a 2 to 1 ratio is needed to address the temporal losses associated with replacing a highly diverse system with a newly created wetland.

In their 28 November 2000 letter, Newport News addressed this issue again and reiterated how their Mitigation Plan goes beyond the general requirements of the District's mitigation policy. The District determines mitigation ratios on a case-by-case basis for each project depending on the size of the impact and the quality of the system. In the paper entitled "Evaluation of the Effectiveness of Within Watershed Compensation in Response to Permitted Activities through the Norfolk District's Section 404 Regulatory Program", Jones and Boyd reported that an overall mitigation ratio of 1.7 to 1 was achieved during the assessment period of 1996, 1997 and 1998. That overall ratio took into consideration projects that involved impacts to emergent, scrub-shrub and forested wetlands.

It is not unusual for the mitigation ratios to be higher for a project with impacts of the magnitude proposed by the RRWSG. Generally when the Corps permits project impacts with mitigation, the project does not eliminate an entire, highly diverse system such as would be impacted by this project. It is not appropriate to compare the ratio of mitigation required for this project with other projects reviewed by the District, since this project would have substantial impacts (orders of magnitude higher than usual projects) to an entire wetland system. The proposed project represents a larger impact than the Norfolk District typically authorizes in a single year for all projects. According to the Norfolk District Regulatory Database, the District permitted a total of 394.4 acres of impacts in 1996, 267.5 acres in 1997 and 266.4 acres in 1998. These impact totals are for the entire state for each individual year. The impacts from the King William Reservoir would be more than the total amount of impacts typically permitted in an entire year in the State of Virginia.

(xi.) Stream Compensation: The mitigation proposal for the 21 miles of stream channel impacts includes restoration of 21 miles of stream channel in other off-site locations. The proposed stream restoration plan is described in the May 1999 Final Wetland Mitigation Plan. The consultants have identified degraded stream systems in the Green Springs National Historic Area in Louisa County, Virginia. On 23 February 1998, District and Service representatives reviewed the potential stream restoration sites. The area includes both intermittent and perennial stream channels. Many of the streams

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have been affected by livestock accessing the streams. The RRWSG proposes to analyze each particular stream using the following parameters: stream bottom and bank conditions, erosional forces, width and presence of vegetated buffers, and the practicability and long-term success potential of performing the work. The proposal for each stream restoration effort would vary depending on the condition and the reasons for the degradation. Options could include encouraging development of riparian buffers, nutrient and pesticide management, livestock exclusion through fencing, and bioengineering to reduce erosional forces. The goal of the proposed work is to improve water quality in the streams and increase the habitat value. Where possible, preservation of the restored channels and other land use restrictions would be utilized to protect the stream corridors from additional impacts. However, conservation agreements may not be in perpetuity and would be dependent on agreements with individual landowners. The landowners' desires and the RRWSG's ability to maintain the fencing in the future would also affect the amount of protection to the streams.

At the Mitigation Team meeting on 26 June 1998, the RRWSG indicated that 21 miles of intermittent and perennial stream channel restoration would occur at a 1 to 1 ratio for stream miles and stream order. Specific proposals for stream restoration have not been submitted to the District and the agencies, so it is difficult to determine if that goal was met. No further discussion about the stream order of the restoration channels was offered. In addition, the long-term benefits and success of the proposal are difficult to determine without knowing the level of individual landowners' participation and willingness to continue the stream restoration in perpetuity.

The May 1999 Wetland Mitigation Plan also indicated 6.4 miles of stream between the proposed dam and the Cohoke Millpond would be preserved. As discussed previously, the RRWSG has been unwilling to propose preservation in perpetuity in hopes of using the area in the future for expansion of the dam if the project is permitted. This is not an acceptable mitigation option since the long-term viability is questionable.

The Mitigation Team has also discussed restoring stream channels on some of the proposed mitigation sites, such as Davis Farm, Terrell and Taliaferro sites. Stream restoration has been encouraged in corridors, which would tie into other natural wetland systems. Breaching impediments to anadromous fish migration has also been suggested as being connected to the stream restoration plans.

While stream restoration alone is commendable, the action still does not compensate for the loss of a stream valley complex found in the Cohoke system. The Service expressed their concern for the disjointed form of compensation in a 22 July 1999 letter to the District addressing the Final Wetland Mitigation Plan. The Service indicated, "The applicant's Final Plan proposes to perform stream mitigation predominantly separate from the wetland mitigation, further demonstrating that the stream valley wetland complex has been torn into two disjunct, ecologically disconnected components for mitigation purposes." I do not believe that the proposed stream restoration could fully mitigate for the loss of 21 miles of contiguous stream channel.

(xii.) Environmental Issues Summary: The RRWSG submitted the Environmental Issues Summary in August 1999 in response to my preliminary position of denial of the project. The RRWSG indicated that report was not intended to provide new information, but to summarize their project and reiterate all the benefits they believe the project would provide. However, the report made many claims that had not been made previously and were not substantiated.

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The RRWSG contends that a positive net environmental impact can be achieved when implementing the King William Reservoir Final Mitigation Plan. The District agrees with EPA's opinion that, "There is no net gain as a result of the RRWSG mitigation plan but rather, if all goes as planned, an offset of impacts, a compensating equivalent [in wetland acreage]." An offset of the acreage of impacts is only seen if the mitigation sites are fully successful. The Environmental Issues Summary indicates that the open water of the reservoir and the mitigation sites would represent a net gain in wetlands. The District believes that over several years, a net gain in acreage may occur if all the proposed mitigation is fully successful. However, a gain or even a compensatory equivalent in net function has not been demonstrated. EPA has maintained their belief that "the complex mosaic ecosystem which will be impounded by the reservoir can not be replicated." The Service expressed similar opinions in a 25 July 1997 letter, "Based on the Service's extensive involvement evaluating the evolving wetland mitigation plan, we do not see the possibility that the applicant can adequately replace the wetland functions, contiguous habitat, and wetland types that the project proposes to impact."

(xiii.) Uplands Preserved: The City of Newport News has included as a part of their mitigation package those remaining portions of several of their mitigation sites (totaling approximately 1,000 acres) that are unsuitable for wetland compensation, as buffer areas adjacent to the created and restored wetland areas. These upland areas must be purchased along with mitigation site. In many cases these upland areas comprise a portion of the contributing watershed to the proposed compensation sites, and their preservation would help ensure the long-term protection of at least a small part of the hydrologic inputs from the catchment.

The RRWSG's Mitigation Program, Fish and Wildlife Mitigation Plan also offers as compensation for the upland that would be inundated by the reservoir, the 1,900 acres of upland forest that surrounds the reservoir as a buffer. The 100-foot water quality buffer would total 1,300 acres and the 100-foot construction setback, in which development would be limited, would be 600 acres. The mitigation proposal also includes the temporary preservation of 620 acres of upland located between the proposed dam and Cohoke Millpond. However, as the upland below the proposed dam would not be held in perpetuity, future impacts could occur in that area.

The City claims that their preservation of upland would create large areas of habitat for species that require contiguous hardwood forests and that the reservoir buffer would provide forest and riparian edge habitat that can support several species. The 100-foot construction setback provides no guarantee that an undisturbed forested area would remain. It is unclear as to whether that construction setback buffer would be owned by the adjacent property owner or the City of Newport News. The benefits to wildlife would be limited due to use of the reservoir and surrounding land for recreation and by any future adjacent property owners.

In a 16 July 1997 letter, Natural Heritage concluded that the total 200-foot wide construction setback and water quality buffer would essentially be edge habitat, not contiguous forest with habitat value to interior dwelling species. Species in this area would be trapped between the reservoir and rural/suburban development on the other side. Natural Heritage indicated that research has shown such areas in forest patches are actually detrimental to breeding neotropical migratory bird species.

(f) Summary of District's Findings on Compensation Proposals: In the 28 November 2000 letter addressing the agencies' response to the Final Mitigation Plan, Newport News rebutted the opinions that the Plan offers mitigation that is hydrologically and ecologically out-of-kind. In "Mitigation

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Technical Guidelines for Chesapeake Bay Wetlands”, which was published with interagency cooperation in 1994, Eckles *et al.* define in-kind replacement as “compensatory mitigation activities which replace the hydrologic core and structural factors, ecosystem processes, functions, and values of a project wetland.” As noted in “Mitigation Technical Guidelines for Chesapeake Bay Wetlands”, “wetland communities located within a riparian corridor are affected by stream hydraulics (e.g., overbank flow rates and duration, sediment deposition, and scouring), whereas other wetland communities are more affected by groundwater, direct precipitation, and surface runoff. The hydrologic core factors of the two communities are different.” Different sources of water and energy of flows affect the nutrient cycling, community dynamics, organic matter production, decomposition, and export of carbon. It is important to note that the proposed sites generally do not provide in-kind replacement of the Cohoke stream valley complex.

The concept of impacting one large wetland system and replacing it with smaller wetlands located throughout the watershed is contrary to the mitigation banking policy used by the Corps. The “Federal Guidance for Establishment, Use, and Operation of Mitigation Banks” indicates that mitigation banking “typically involves the consolidation of small, fragmented wetland mitigation projects into one large contiguous site.” Consolidating the impacts helps to more effectively replace lost wetland functions. Replacing a large contiguous wetland system with individual sites scattered throughout the landscape does not fully compensate for the proposed losses. While the individual sites do provide a habitat benefit, they cannot compensate for the loss of a large contiguous system with inter-related upland, vegetated wetlands, shallow open water, and varying hydrologic regimes. Piecemealing the compensation sites in the various hydrogeomorphic settings cannot fully compensate or provide the same functions as the existing free-flowing riverine system of the Cohoke Creek.

The 34 acres of open water that would be impacted by the project would not be offset by the creation of the 1,526-acre lake as claimed by the City of Newport News. These water regimes are totally dissimilar and do not provide the same types of wildlife habitat or water quality functions. Also, the applicant’s proposed enhancement and restoration of other streams does not replace the streams that would be lost. Furthermore, open water areas have limited functions, which are not typically as valuable as the functions of existing swamps, such as found in the Cohoke system.

In a letter dated 12 March 1997, VIMS expressed concern over the success of the applicant’s mitigation proposal. “It is not clear that highly scattered areas of creation, restoration and preservation will accomplish the compensation goal envisioned for them given the overall complexities of the present landscape and our relative lack of sophistication at present when it comes to evolving wetland-landscape interactions.” EPA commented that the diverse wetland communities at the King William site might be extremely difficult, if not impossible, to adequately replace. In a letter dated 23 August 1996, the U. S. Fish and Wildlife Service commented, “The Service does not believe it is practical or possible to mitigate for the loss of an entire watershed. To attempt to mitigate for the steeper mature forest uplands grading into very wet palustrine forests and emergent systems requires a unique mix of landscape position and quantity, seasonality and duration of hydrology.”

Newport News has identified acreage for 2 to 1 compensation. However, their plan has not demonstrated functional compensation for the wetland impacts or that there would be adequate hydrology to support the desired wetland species at all sites. The proposed mitigation sites do not re-create the stream valley wetland complex of the Cohoke wetlands that would be lost. I am concerned about replacing the free-flowing stream valley complex with mostly depressional wetland systems that do not replace the functions of the impacted wetlands. I am also concerned about replacing one large contiguous system

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with smaller unrelated sites. (A more detailed discussion of the various compensation proposals can be found in Norfolk District's report entitled "Analysis of wetland and habitat impacts and the Regional Raw Water Study Group's proposed compensation for the proposed King William Reservoir.")

g. Endangered or Threatened Species: Impacts to three federally listed threatened species; the small whorled pogonia (*Isotria medeoloides*), the sensitive joint-vetch (*Aeschynomene virginica*), and the bald eagle (*Haliaeetus leucocephalus*), were evaluated for this project. Informal consultation with the U.S. Fish and Wildlife Service led the District to determine that formal consultation would not be required for the bald eagle but would be required for the small whorled pogonia and the sensitive joint-vetch pursuant to Section 7(a)(2) of the Endangered Species Act. It should be noted that the level of protection and the need for consultation for federally listed threatened species is the same as for federally listed endangered species under Section 7 of the Endangered Species Act. On 2 February 1998, the District initiated formal consultation with the Service and the Service's Biological Opinion was finalized on 18 September 1998.

The Service concluded that neither the proposed action nor its cumulative effects are likely to jeopardize the continued existence of the small whorled pogonia or sensitive joint-vetch species. However, a "no jeopardy" opinion does not mean that the proposed work will not affect listed species. Rather, it means that this one action alone would not lead to the extinction of the entire species being considered, even though there may be harm, functional impairment or destruction of an individual population. No critical habitat has been designated for these species, so none would be impacted. (For a detailed discussion of endangered species issues, see the District's report entitled "Endangered Species Consultation for King William Reservoir Project.")

(1) Bald Eagle: The bald eagle is protected under the 1940 Bald and Golden Eagle Protection Act. This species was federally listed as endangered in 1967, but was reclassified to threatened in 1995. The 6 July 1999 proposal to delist the bald eagle is controversial in the Chesapeake Bay population due to heavy development pressure in the region that threatens their habitat; therefore, delisting has not taken place. The bald eagle is currently listed as threatened in Virginia. Bald eagles are particularly sensitive to noise and other disturbances from human activities, especially during nesting and foraging.

A bald eagle nest is located approximately 10,100 feet (1.9 miles) downstream of the KWR-IV dam construction site. The pipeline from the KWR-IV dam to the existing Diascund Reservoir would be more than 0.5 miles from the nest. Another bald eagle nest has been documented on the Mattaponi River approximately 1,800 feet (0.3 miles) from the proposed intake location at Scotland Landing. These nests are beyond the designated 0.25-mile radius buffer (1,320 feet) within which human activities could disturb eagles or degrade their habitat; therefore, the Service concluded that if noise disturbances are not excessive, the proposed reservoir construction would not be likely to adversely affect the bald eagle at the King William Reservoir Site.

During informal consultation for endangered species under Section 7 of the Endangered Species Act, discussions over management issues for the bald eagle took place between the applicant, the District and the Service. In a 28 March 1996 letter, the Service recommended tight control of sedimentation during construction to avoid interference with foraging success of the eagle. Another nest is located near Chestnut Grove Landing, approximately 0.25 miles west of the pipeline to Diascund Reservoir. In a 25 July 1997 letter, the Service recommended time-of-year restrictions from 15 November through 15 July on pipeline construction activities to prevent disruption to bald eagles during the critical nesting period.

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Also, if active eagle nests are located in the vicinity of any of the proposed wetland mitigation areas, additional coordination would be necessary. The Virginia Department of Game and Inland Fisheries also recommended the same time of year restriction and recommended that all nests should be protected by a management zone of 750 feet since disturbances during this period may lead to nest abandonment and/or chilled or overheated eggs or young, or premature fledging. The VDGIF also stated that no human activity or habitat alteration, including construction, should occur in this zone during the nesting season from 15 November through 15 July and that all of the forested reservoir shoreline should be protected by a management zone that extends at least 330 feet inland and prohibits clearcutting, land clearing and construction. A management zone and its governing rules should be established in cooperation with the VDGIF and the U. S. Fish and Wildlife Service.

In the informal consultation process, the Service provided recommendations to minimize potential impacts to both existing and newly established eagle nests that could occur during construction and operation of the pipeline and reservoir. The applicant agreed to these recommendations and they were included in their proposed management plan contained in the District's January 1998 Biological Assessment. Although the bald eagle was included in the District's letter initiating formal consultation, the Service stated in their letter of 27 February 1998 that their concerns over potential impacts to bald eagles had been resolved through the informal consultation process. Therefore, the bald eagle did not need to be included in the formal consultation. However, there is no mention of these management measures in the RRWSG's October 1999 Mitigation Program, Fish and Wildlife Mitigation Plan. I concur with the management measures recommended by the Service and VDGIF and agree that the recommendations should be incorporated as conditions if a Corps permit were issued for the project.

(2) Small Whorled Pogonia: The small whorled pogonia was federally listed as endangered in 1982, but reclassified from endangered to threatened in 1994. This orchid is also listed as a state endangered species in Virginia. The small whorled pogonia was found in two locations within the pool area of the proposed King William Reservoir. Both locations would be flooded by the currently proposed King William Reservoir. However, as recent clearcutting and burning has rendered the habitat at Colony 1 unsuitable for the pogonia, it is considered no longer extant at that location. Colony 2 is located at approximately 64 feet mean sea level and would be inundated at the normal pool elevation of 96 feet mean sea level. Because Colony 2 would be flooded and destroyed, the Service concluded that direct impacts would occur to the small whorled pogonia.

As reported in the RRWSG's Mitigation Program, Fish and Wildlife Mitigation Plan, one colony was present in 1995, but not in 1996. The applicant claims that the project would have no impacts on the small whorled pogonia because only one individual of Colony 2 was observed in 1997 and none have been observed since that time. This claim was reiterated in the applicant's Environmental Issues Summary, based on one site visit by Malcolm Pirnie staff in late June 1999. A July 2000 survey conducted by the applicant also reported no observed plants in the colony. The applicant believes that the site has no long-term viability because beaver activity 2 to 3 years ago opened the forest canopy and altered the site's suitability to support the small whorled pogonia.

It cannot be assumed that because small whorled pogonia plants were not found in a location, they would never be present there again. Small whorled pogonia plants can occur one year and not be found the next. Colony size and stem counts can fluctuate widely on an annual basis because individual plants may not emerge every year, but may lie dormant for up to seven years. The U. S. Fish and Wildlife Service commented that Colony 2 ".....is particularly interesting due to their larger than normal size and their

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reproductive status. Plants that have twin flowers are considered to be particularly well-established and to have a strong energy source.” Therefore, it should not be automatically assumed that Colony 2 no longer exists.

As mitigation for the adverse effects to the species, the applicant offered to relocate the affected small whorled pogonia plants to a protected site. Experience has shown the Service, and the Virginia Department of Conservation and Recreation Division of Natural Heritage that individuals of the species do not survive transplanting; therefore, mitigation usually entails the purchase and preservation of property that contains known populations of the species that are under threat of destruction from development. The Service's conservation recommendation to minimize the impacts of the proposed action on the small whorled pogonia was the perpetual preservation of the Casey Colony in James City County. Monitoring and site management would be a component of the preservation plan.

Although the applicant considers the habitat at the Colony 2 to be marginal, they have agreed to the Service's conservation recommendation. Dr. Donna Ware of the College of William and Mary has identified several sites with known populations and suitable habitat for the small whorled pogonia as candidates for preservation (White Marsh Colony in Gloucester County, the Casey/Ford's Colony site in James City County and a remnant of the Grimes Colony in James City County.) The applicant's plan would be to attempt to secure the Casey Property/Ford's Colony Site in James City County to preserve the small whorled pogonia population that is under threat from land development. However, if that site is not available, purchase of the other sites with pogonia colonies would be attempted. Although they claim there would be no plants to move, an attempt to relocate plants that would be affected by the reservoir to suitable locations remains a part of the applicant's plan.

(3) Sensitive Joint-Vetch: The sensitive joint-vetch was federally listed as threatened in 1992 and is listed as very rare and imperiled in Virginia. A large population of the sensitive joint-vetch has been recorded in five areas along a 15-mile stretch of the Mattaponi River between Walkerton (river mile 28) and the Wakema/Gleason Marsh (river mile 13) predominantly in the tidal freshwater portion of the River (0.0 ppt salinity). The Wakema/Gleason Marsh population falls within the oligohaline salinity regime (0.0 to 0.5 ppt salinity). Populations of this species are located on the north side of the Mattaponi River within the Garnetts Creek Marsh directly across from the proposed intake site at Scotland Landing (approximately 2.5 acres of habitat), and in a small pocket marsh on the south side of the river downstream of White Oak Landing, approximately 600 feet upstream of the intake site. The Garnetts Creek Marsh is classified by the Virginia Department of Conservation and Recreation Division of Natural Heritage as an exemplary freshwater tidal marsh and is ranked as an excellent occurrence of this community type. The Service concluded that no direct impacts to the sensitive joint-vetch are anticipated from the construction and operation of the proposed intake structure, pier and boathouse at Scotland Landing. However, indirect impacts associated with the withdrawal of freshwater from the Mattaponi River may occur to all locations of the species on the River through changes in salinity and water quality. Also, the beds closest to the intake could be indirectly impacted by erosion or accretion of the point-bar habitats on the shoreline.

The sensitive joint-vetch is also found at five locations in the tidal freshwater zone of the Pamunkey River along a 19-mile section from Holts Creek/Cumberland Marsh to Clayborne Creek Marsh. As the Mattaponi and Pamunkey Rivers converge to form the York River, potential salinity changes from freshwater withdrawals in one tributary have the potential to affect salinity levels in the other tributary. Therefore, the Service concluded that the “action area” for the sensitive joint-vetch would include the

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tidal freshwater zones of both rivers. Consequently, the Service expressed concern about the potential effects of salinity and water quality changes not only to the colonies near the proposed intake, but also to populations downstream of the intake as well as throughout the York River basin, and made six conservation recommendations to minimize or avoid adverse effect of the proposed action on populations of the sensitive joint-vetch.

The Service's priority recommendation for protection of the sensitive joint-vetch population in the York River system was the maintenance of natural variability by placing minimum instream flow restrictions on raw water withdrawal from the Mattaponi River. The Service does not believe that the RRWSG's proposed minimum flow of 40%/20% of Mean Annual Flow would have enough linkage to biological processes and historic flow regimes to maintain natural variability. Since so little is known about the exact habitat requirements and ecological niche of the sensitive joint-vetch, it is not known if variations from normal conditions during the months of early spring may be critical to its growth process. The life cycles of many riparian plants have adapted to the seasonal timing of the natural flow regimes through the sequence of flowering, seed dispersal, germination and seedling growth. Seasonal timing is particularly important to annual plants like the sensitive joint-vetch, that have to reestablish their populations every year. The Service feels that it is critical to closely follow the natural regime as much as possible and recommended using the more conservative modified 80% Exceedence MIF to reduce or eliminate impacts to the sensitive joint-vetch colonies near the intake and farther downstream. This would be consistent with recommendations of the Virginia Department of Game and Inland Fisheries and one of the conditions of the Virginia Department of Environmental Quality's (DEQ) Water Quality Certification/Water Protection Permit which stipulates a Mattaponi River flowby regime of 80% exceedence of each month's flow duration statistics.

However, the applicant believes that there would be a nearly undetectable difference between the 40/20 Tennant Minimum Instream Flow and natural variation in the river system and is opposed to the use of the Modified 80% Exceedence MIF because it would minimize opportunities for filling the reservoir during periods of high flows. Immediately after the DEQ permit was issued, the applicant brought suit against the SWCB to challenge this condition and has indicated to the District that such a restriction would not provide enough water to make the project economically feasible. However, when the Court determined that the City of Newport News did not have legal standing to sue the state, the City did not appeal the decision. Rather, they indicated that they would request a modification of the DEQ permit when it is due for re-issuance in 10 years. Based on my concerns for potential impacts to sensitive joint-vetch colonies as well as a number of other concerns outlined elsewhere in this document, I have determined that flow-bys based on the Modified 80% Exceedence for the withdrawal rules in the Mattaponi River must be required if a Corps permit were issued (see Section 8 e. (1)(a)).

As a part of the Mattaponi River Monitoring Plan that the District has developed in conjunction with the multi-agency team, the Service recommended investigating the impacts of the withdrawal on the sensitive joint-vetch during the reservoir-filling phase as a worst-case situation. They stated that if the District's required River Monitoring Plan reveals impacts from the water withdrawal or intake structure, they would consult the District and the Service to determine appropriate strategies for remedying the impact. Formal consultation under Section 7 of the Endangered Species Act was being undertaken simultaneously with the development of monitoring conditions; therefore, the development of monitoring protocols for the sensitive joint-vetch by the monitoring team would have been premature. Further discussions would have to be undertaken with the Service to determine appropriate monitoring protocols.

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The Service also recommended annual monitoring of all extant and historical populations of sensitive joint-vetch on the Mattaponi River and Pamunkey River for a ten-year period. The applicant did not agree to monitor all colonies of sensitive joint-vetch but indicated they would monitor what they consider to be a reasonable, but undisclosed, number of colonies. I do not necessarily agree with the Service that all colonies both the Mattaponi and Pamunkey Rivers should be monitored. Further evaluation would be required to determine which colonies should be monitored if a Corps permit were issued for the project.

The Service expressed concern that construction disturbances may bring about the invasion of common reed (*Phragmites australis*) which could affect the marsh community near the intake and indirectly threaten the existing sensitive joint-vetch and other suitable habitat. Therefore, the Service recommended strict control of invasive species at the Scotland landing intake site both during and after construction activities. The applicant agreed to this recommendation.

The Service recommended coordination with state and local agencies, to mark the navigation channel to minimize boat wake impacts to the sensitive joint-vetch habitat at Garnetts Creek Marsh, if it becomes necessary. The applicant does not believe that the proposed intake structure would affect river traffic or move it closer to the marsh; nevertheless, they agreed to petition the authorities to provide channel markers to better control boat traffic in the vicinity of the intake.

The Service also recommended land acquisition or conservation easement protection of sensitive joint-vetch habitats at Garnetts Creek Marsh and Gum Marsh and upland buffers in conjunction with the applicant's wetland mitigation plan. The applicant was not amenable to purchasing property or a conservation easement on sensitive joint-vetch colonies unless the District would agree to accept wetland preservation as a priority compensation component of the wetland mitigation instead of wetland creation or restoration. The District and the federal advisory agencies concur that priority should be given to wetland creation and/or restoration with reliance on preservation only as a final option.

In response to the Service's Final Biological Opinion, the RRWSG agreed to three of the six conservation recommendations outlined above. However, in their Mitigation Program, Fish and Wildlife Mitigation Plan, the RRWSG reiterated their belief that the impacts to the sensitive joint-vetch habitat from the construction and operation of the intake at Scotland Landing would be negligible, and offered to locate work staging areas away from wetland areas, implement sediment control measures at all times and avoid compaction and disturbance of wetland soils as steps to "further minimize the potential for adverse effects." As there is no mention of the previous agreement to the Service's conservation recommendations in the mitigation plan, it would appear that the applicant might now be replacing their agreement with these three measures. Such measures to minimize the adverse impacts associated with construction would be automatically included in any Corps permit as special conditions, and the implementation of standard erosion and sedimentation controls are required by state and local agencies responsible for ensuring that Best Management Practices are followed. These general measures would not provide protection for the sensitive joint-vetch equal to the Service's recommended measures.

With the exception of the number of colonies to be monitored, I agree with the need to implement all six of the Service's conservation recommendations for the sensitive joint-vetch. I have concluded that without implementation of these recommendations, the construction and operation of the intake has the potential to result in indirect impacts to colonies of sensitive joint-vetch in the vicinity of the intake.

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The issuance of the Biological Opinion concluded the Formal Consultation process. However, if federally listed threatened or endangered species are found to be present on or near any of the proposed mitigation sites, or the relocated sections of the pipeline, formal consultation may need to be reinitiated. Also, King William County has indicated that they plan to develop Scotland Landing Park, a recreational park on the remainder of the land purchased for the construction of the intake and pump station. Depending on the type of development, the sensitive joint-vetch population on the south side of the river could be affected by those actions.

h. Other Rare or Protected Species: According to the Virginia Department of Conservation and Recreation Division of Natural Heritage, in addition to the sensitive joint-vetch, the Mattaponi River supports populations of several rare plants: marsh senna (*Chamaecrista fasciculata* var. *macroserpa*), small water-wort (*Elatine minima*), Parker's pipewort (*Eriocaulon parkeri*) and tropical water-hyssop (*Bacopa innominata*). Increased salinity levels and changes in water quality from the withdrawal of freshwater could adversely affect these plant species.

The great blue heron would also be adversely affected by the project in two separate locations. Great blue herons are protected under the Migratory Bird Treaty Act, which is enforced by both the U.S. Fish and Wildlife Service and the Virginia Department of Game and Inland Fisheries. The great blue heron carries a state heritage ranking of S3, which means that it is rare to uncommon and may be somewhat vulnerable to extirpation. Loss of habitat, particularly nesting habitat, is considered a threat to the species.

A great blue heron rookery is located within the proposed KWR-IV reservoir pool area north of Route 626. The rapid growth of this rookery from 3 nests in 1993 to 17 nests in 1995 indicates the potential for further expansion. Great blue herons thrive in natural habitats where there is limited predator and human access, nesting primarily in riparian swamps with large trees. Most of the 17 nests were located in dead white oak trees within an open water beaver pond. The rookery would be inundated by the reservoir forcing the breeding individuals to find another area to nest. The Virginia Department of Game and Inland Fisheries stated that the rookery area should be protected from reservoir basin clearing activities, the rookery trees should not be removed, and no construction activities should take place within 0.25 miles of the rookery from March 15 through July 30. The RRWSG has not agreed to incorporate these recommendations into their plans and claims that suitable nesting habitat is likely to be in abundance in nearby watersheds. The U.S. Fish and Wildlife Service disagreed with the RRWSG's unsupported claim and expressed concern that the overall carrying capacity of the region for nesting herons would be reduced by the proposed reservoir.

The relocated outfall structure on Beaverdam Creek could also adversely impact a small nesting population of the great blue heron. Disturbances from construction and operation of the outfall and channelization of 150 feet of vegetated wetlands directly beneath the 4 nests of this great blue heron rookery could force the nesting pairs from the rookery and abandonment would occur. The RRWSG has failed to include any discussion regarding efforts to avoid or minimize these unnecessary and, therefore, unacceptable impacts to the rookery.

i. Other Wildlife: Approximately 1,526 acres of wildlife habitat within KWR-IV pool area would be converted to open water. Terrestrial and wetland-dependent wildlife would be affected by the inundation of wetland and forested areas. Many species inhabiting the flooded area would be forced to relocate to other areas of similar habitat, if available. If neighboring habitats are at or near their carrying capacity for a particular species, the competition for available food supply would result in malnutrition

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and mortality and an overall reduction of the population of that species in the area. Less mobile species and species dependent on large contiguous habitats would be the most affected by the reservoir construction. Reptiles, amphibians and some small mammals would be less likely to relocate unless suitable habitat is available immediately adjacent to the pool area. These individuals would not survive.

An aquatic fringe would most likely become established around the reservoir; however, the fringe would not provide the same diversity of habitat as that present in the existing Cohoke Creek system. Furthermore, water level fluctuations and periodic drawdowns associated with reservoir operation would decrease the habitat value and use of the aquatic fringe by wildlife. Reduction in habitat could also affect temporary resident species such as neotropical migratory songbirds that rely on large areas of temperate forest for breeding. Reduced habitat from forest fragmentation could result in decreased breeding success and an overall population reduction. Species currently utilizing palustrine wetlands would be adversely affected since much of their food sources would be destroyed by the removal and flooding of the vegetation.

Clearing of forests along the pipeline route would result in fragmentation of habitat for some interior forest species. The cleared right-of-way could also allow the introduction of edge species, which compete with, or prey upon interior forest species.

j. Anadromous Fish and Other Fishes:

(1) Mattaponi River: Fish collection records for the Mattaponi River between 1993 and 1995 identified 13 fish species including five species of anadromous fish. Anadromous fish species documented as utilizing the tidal freshwater reaches of the Mattaponi River for spawning and nursery grounds are the American shad (*Alosa sapidissima*), Hickory shad (*Alosa mediocris*), Alewife (*Alosa pseudoharengus*), and Blueback Herring (*Alosa aestivalis*). Semi anadromous species include white perch (*Morone americana*) and yellow perch (*Perca flavescens*).

Over-fishing and the construction of impediments to upstream migration have resulted in a decline in anadromous fish in all Virginia rivers. The reproductive viability of American shad is of particular concern because shad populations have slowly but steadily declined over the past 100 years. State and federal agencies are currently involved in conservation efforts to restore habitat and increase American shad populations. Hatcheries operated by the Mattaponi and Pamunkey Tribes on their reservations contribute to this effort. Based on recent unpublished data, anadromous fish populations in the Mattaponi River presently appear to be relatively high compared to other Virginia rivers, although still low by historical standards. Recent surveys also indicate that shad populations in the York and Rappahannock Rivers have stabilized most likely due to the fishing moratorium. However, traditional fisheries management has not been effective in expanding the shad populations, and researchers have acknowledged that the complex interactions of the complete ecosystem must be taken into account. Therefore, new studies at the Virginia Institute of Marine Science are underway to examine the critical stages of the shad's life cycle and to determine what types of habitat are essential to reproductive success.

The taking of shad in the rivers is prohibited to the general public due to depletion of stocks by over-fishing and habitat degradation. However, the Mattaponi and Pamunkey Tribes hold tribal fishery rights and are exempt from the state closure. Many members of the Mattaponi Tribe depend on fish from the Mattaponi River for both their subsistence and as a source of income, and the Tribe operates a shad

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hatchery to restore and replenish shad populations in the River. The Mattaponi Tribe's shad hatchery contributes from 6 to 10 million shad fry every year to Virginia's waters.

On behalf of the Mattaponi Tribe, the Institute for Public Representation (IPR) submitted letters dated 25 July 1997 and 14 January 2000 outlining the Tribe's concern that the proposed withdrawal of up to 75 mgd of freshwater from the Mattaponi River could result in significant adverse impacts to American shad and related fish species. IPR's 14 January 2000 letter included letter reports, dated 17 December 1999 and 12 January 2000, from Dr. Edward F. Cheslak, an aquatic ecologist, commenting on the potential adverse effects of the project on anadromous fishes in the Mattaponi River. In these letters, IPR and Dr. Cheslak expressed concern that the upstream intrusion of brackish water into the tidal freshwater reaches of the Mattaponi River along with changes to hydrologic patterns and tidal dynamics would adversely affect American shad habitat, disrupt spawning behavior and affect the viability of eggs and the survivability of larvae and juveniles. Also, the letters expressed concern that the withdrawal of so much water might increase water temperatures and reduce oxygen levels in the summer resulting in adverse effects to shad and herring nursery areas. Since the intake facility would be located within the prime spawning area for shad and other anadromous fish, there is concern that the intake would harm fish eggs and juveniles, remove the fishes' food supply and concentrate predatory fish. In addition, noise from the operation of the pumping station could disrupt fish migration and spawning habits. Turbulence and increased siltation from periodic backflushing to clean the intake pipe could further threaten the fish. If the project is approved, the Mattaponi Tribe has requested that no withdrawals be allowed during the critical spring shad spawning period to provide protection for the more vulnerable eggs and juveniles.

The U. S. Fish and Wildlife Service has expressed concern that the potential of saltwater intrusion to decrease the tidal freshwater zone of spawning habitat on the Pamunkey and Mattaponi Rivers could seriously impact populations of American shad and striped bass. In their 28 March 1996 letter, the Service commented, "Virginia and CPB's (Chesapeake Bay Program) successes in opening historic habitat to reverse dramatic declines in shad and striped bass populations should not be negated by the reduction in available tidal freshwater habitat from RRWSG water withdrawals." In an attempt to address the concerns of the Tribes and the state and federal agencies, the applicant contracted Dr. Greg Garman of Aquatic Resources, LLC, to conduct a study of the potential impacts of the proposed withdrawal on anadromous fish. As part of the study, Dr. Garman attended a meeting with the Mattaponi Tribe, the District and EPA on 28 April 1997 to discuss the Tribe's concerns and to more clearly understand the issue from their unique point of view. In a report entitled, "Analysis of Potential Effects of Water Withdrawals for the King William Reservoir on American Shad (*Alosa sapidissima*) and Related Anadromous Clupeid Fishes in the Mattaponi River, Virginia, A Review of the Current and Relevant Scientific Literature", dated 7 August 1997, Dr. Garman provided a qualitative evaluation of the potential for adverse impacts as the direct result of the water withdrawal. Dr. Garman found that fish assemblages of the tidal freshwater portion of the Mattaponi River have been inadequately surveyed and relevant and useful data on anadromous fish in the Mattaponi River is extremely limited. Dr. Garman concluded that "With a few exceptions, there existed only a very limited amount of biological or ecological information that can be used to make direct judgments concerning the likely impacts of the King William Reservoir on the ecologically and economically important anadromous clupeid populations of the Mattaponi River." Dr. Garman further stated that without the availability of such basic descriptive information as temporal and spatial distribution, spawning and early life history stages, it was very difficult to accurately assess the potential for ecological impacts from the proposed project.

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One potential impact that could result from the intake operation is unacceptable fish mortality from entrainment and impingement of fish eggs and larvae. The applicant has designed the intake in accordance with the recommendations of the National Marine Fisheries Service and Virginia Department of Game and Inland Fisheries to reduce impacts to anadromous fish. The intake design incorporates wedge-wire slot mesh screens with one-millimeter screen openings and entrance velocities not to exceed 0.25 feet per second. Also, the intakes would be placed midway between the river bottom and the average water surface to avoid those eggs that float on the surface or roll on the bottom. In addition, the intake structures would be aligned parallel to the river flow. These measures should reduce impacts to anadromous fish eggs and larvae. However, even with these measures, some eggs and larvae that are impinged on the intake screens would be damaged or destroyed. As the maximum swimming speed of early American shad larvae is 0.16 feet per second and the maximum intake velocity would be 0.25 feet per second, these early larvae would be unable to escape the intake flow. American Shad and Hickory Shad eggs exceed 1.0 mm in diameter (up to 3.5 mm), and after a 24-hour water-hardening period, are slightly heavier than water. They would likely settle to the bottom, but they are light enough to be re-suspended by currents. On the other hand, the eggs of Alewife and Blueback Herring would be susceptible to greater impact from entrainment because they are considerably smaller (0.87 to 1.21 mm) and are distributed throughout the water column. Some eggs and juveniles of other fish species and food particles that are smaller than the one-millimeter screen openings would be pulled into the intake. This could affect food supplies that are necessary for the survival and growth of juvenile shad and other anadromous fish populations in the Mattaponi River. While it is unknown whether fish would group at the intake and become easy targets for predator species, such behavior has been observed by researchers in other areas.

Because of the lack of recent and quantitative data on American shad distributions, it was not possible for Dr. Garman to predict the effects of changes in river hydrodynamics on juveniles or their critical habitat. However, Dr. Garman felt that if the conclusions of the applicant's salinity study were correct, the withdrawal of water would be unlikely to have a significant, direct impact on early life history stages of anadromous fishes because river discharges are typically higher during the spring when spawning occurs. Nevertheless, he expressed concern that adequate stream flows and natural hydroperiods be maintained during the summer months to protect the riverine and riparian habitat for juvenile fish and suggested the maintenance of a more conservative minimum instream flow (MIF) than the 40/20 Tennant method proposed by the applicant for this critical period. The Virginia Department of Game and Inland Fisheries recommended that the RRWSG adopt the Modified 80% Exceedence flow schedule as well as a time-of-year restriction for all construction activities in the Mattaponi River from 15 February through 30 June to protect spawning individuals.

Although American shad and other related species would be exposed to slightly increased salinity regimes in the freshwater reaches of the Mattaponi River as a result of the freshwater withdrawal, Dr. Garman cited recent laboratory studies which suggest that these fish are strongly salinity tolerant and would not be significantly affected by such changes. During upstream migration, the adult shad would have recently traveled from highly saline waters to freshwater; therefore, Dr. Garman did not concur with the Tribe's claim that adult American shad would be "extremely sensitive" to changes in salinity. However, as American shad spawn only in freshwater (less than 0.5 parts per thousand salinity), any salinity changes associated with the withdrawals could affect where and when these fish spawn in the River. In a letter dated 14 January 2000, the Mattaponi Tribe submitted a review of Dr. Garman's report that was prepared by Dr. Edward F. Cheslak, an aquatic ecologist. Dr. Cheslak referenced a 1997 study by Zydlewski and McCormack indicating that while adult and out-migrating juvenile American shad are known for their

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salinity tolerance, full development of salinity tolerance does not occur until the onset of the larval-juvenile metamorphosis (26 to 45 days from the egg stage). Therefore, there would appear to be the potential for a reduction in the survival, development and growth of early life stages of shad as a result of salinity changes in the Mattaponi River. The viability of the shad fry that are released from the Mattaponi Tribe's hatchery could also be affected as they are released before this metamorphosis occurs. The fry are released in two stages. Those that are not tagged are released 7 to 9 days after hatching, while those held for tagging are released 16 days after hatching. The applicant has cited earlier laboratory studies indicating that shad and blueback herring eggs and larvae can tolerate a wide range of salinity levels.

Based on the limited information available to him and on the assumption that the applicant's predicted salinity and hydroperiod changes are accurate, Dr. Garman concluded that "there does not appear to be a substantial or scientific basis to claims of significant and detrimental impacts to migratory fish populations in the Mattaponi River as the direct result of the construction and operation of the King William Reservoir." However, Dr. Garman particularly noted that his review did not consider the potential for indirect ecological effects as the result of physicochemical changes on fish assemblages of the tidal Mattaponi River. Dr. Garman noted that his conclusions are based on a review of the currently available literature and did not include field data collection.

Dr. Cheslak disagreed with much of Dr. Garman's findings and believes that the report is incomplete because it is limited to direct results of the water withdrawal only and does not address indirect effects. Dr. Cheslak stated that such an omission is biologically significant as many of the major impact of water withdrawals on anadromous fish are indirect in nature. He further criticized the report for making any conclusions regarding detrimental impacts to anadromous fish with so little available data. Dr. Garman concurred that there was so little useful data available on the fishes and the system ecology of the Mattaponi River that he was at a disadvantage in his limited study to be able to make specific determinations on potential impacts. However, he stated that his effort complied with the Scope of Work for the study provided by the City of Newport News (personal communication, October 2000.)

(2) Cohoke Creek: Limited fish surveys conducted in Cohoke Creek both upstream and downstream of the Cohoke Millpond dam identified 38 species within the watershed. The Virginia Department of Game and Inland Fisheries indicated that the species lists for the Cohoke Creek and Black Creek sites are "inadequate and poorly represent the true diversity of the system." The U. S. Fish and Wildlife Service stated that fish abundance and diversity information for Cohoke Creek is lacking and that information from the limited sampling is not adequate to assess the impacts of the proposed reservoir to the system. Both the Service and the VDGIF believe that the transformation of Cohoke Creek from a lotic and shallow lentic habitat to deepwater lentic habitat would have a significant impact on the composition of the fish assemblage. Construction of the dam and inundation of the pool area would impact fish species within the reservoir pool area through increased levels of suspended sediment and the elimination of benthic food organisms and vegetation for spawning, nursery and shelter.

The City of Newport News claims that an enormous freshwater fishery would be created by the reservoir which would more than compensate for the project's impacts to resident fisheries. Some of the fish species found in Cohoke Creek have been documented in other reservoirs where conditions were favorable for their existence. Although some fish species may be able to persist in the reservoir, others that rely on the flowing creek system would be eliminated through its conversion to a deep-water lacustrine system. Because of the limited species data, the extent to which extirpation would occur is unknown. The U.S. Fish and Wildlife Service does not consider the replacement of native fish species in

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a lotic habitat by lentic game species as a resources enhancement as claimed by the RRWSG. In his report on the effects of the water withdrawal, Dr. Greg Garman expressed concern that non-indigenous fish stocked in the King William Reservoir would likely escape into the Pamunkey River and eventually become established in the Mattaponi River. These non-indigenous fish could negatively impact native fish in the rivers by predation and competition. The U. S. Fish and Wildlife Service expressed similar concerns and also recommended that resident fish populations that survive in the reservoir be protected from undue entrainment and egg loss at the outflow pipe.

Construction of the King William Reservoir would permanently block the potential passage of spawning anadromous and catadromous fish into the upper 21 miles of Cohoke Creek effectively precluding the future restoration of potential anadromous fish spawning habitat in that section of the Creek. The 1987 Chesapeake Bay Agreement has placed a special emphasis on the removal of blockages to anadromous fish and on restoring historic spawning grounds. According to the National Marine Fisheries Service, the restoration of depleted anadromous fish stocks within the watersheds of the York River basin has been identified as a priority action of the Chesapeake Bay Agreement. Therefore, any manipulation of flow in stream and rivers supporting these species would not be in the best interest of current restoration efforts.

Anadromous fish passage in Cohoke Creek is presently blocked by the existing 100-year old Cohoke Millpond dam. Surveys have identified alosid eggs, larvae and juveniles in the lower tidal portion of the Creek between the millpond dam and the Pamunkey River and there is historical evidence that before the millpond was constructed, Cohoke Creek provided spawning and nursery habitat for blueback herring and alewife. In the spring of 1992, the Virginia Department of Game and Inland Fisheries recorded blueback herring at the Cohoke Millpond spillway and indicated that herring and alewife would spawn in the upper reaches of Cohoke Creek if fish passage was provided. VDGIF has identified herring species as a primary focus of concern due to the currently depressed condition of regional herring populations. Both the U.S. Fish and Wildlife Service and the National Marine Fisheries Service commented that the area upstream of Cohoke Millpond dam represents potential spawning habitat for anadromous and semi-anadromous species. Although Cohoke Millpond is not currently listed as one the state's priority areas for restoration, the U.S. Fish and Wildlife Service feels that fish passage could be readily restored by the installation of a passage device in the 6-foot high Cohoke Millpond dam. The Service disagrees with the RRWSG's claim that the proposed 78-foot high King William Reservoir dam would result in minimal impact to the restoration of anadromous fish habitat.

At the applicant's request, Dr. Greg Garman conducted a visual evaluation of the potential for restoration of spawning activities above the millpond dam and presented his findings in a report entitled "Qualitative Assessment of Instream Habitat Quality of Cohoke Creek (King William County, Virginia) for Anadromous Clupeid Fishes (*Alosa* spp.)", dated 18 September 1997. Dr. Garman clarified that with this type of qualitative analysis, it is not possible to determine the extent to which potential habitat in Cohoke Creek would be utilized by anadromous fish, but offered his opinion based on his observation of existing conditions. Dr. Garman observed outstanding reproductive habitat for *Alosa* spp. in the short tidal reach of Cohoke Creek below the Cohoke Millpond. He felt that if fish passage was provided at the Millpond dam, it is likely that blueback herring and alewife would attempt to spawn in the 2.1 miles between the millpond and the proposed KWR-IV reservoir site. However, Dr. Garman believed that under present conditions, spawning would be unlikely above the proposed reservoir dam site due to the extensive influence of beaver activity and the very limited stream gradient. Since beaver dams and the resultant ponds are not permanent features, this conclusion pertains only to conditions as they existed at the time of Dr. Garman's visual survey. The federal and state agencies who are experts in this matter have

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determined that the area above the Cohoke Millpond dam represents potential habitat for anadromous fish and I have no reason to disagree with their finding.

As mitigation for the reduction in anadromous fish habitat in Cohoke Creek, the Service recommended providing fish passage at a suitable location such as Ashland Mill Dam on the South Anna River as a condition of the Corps permit, if granted. EPA indicated their support for the provision of off-site fish passage as compensation for the loss of habitat in Cohoke Creek. Even though the City of Newport News does not concur that potential anadromous fish habitat would be lost, they agreed to work with the VDGIF to identify dams on one or more priority streams in the York River basin for fish passage restoration. The Ashland Mill Dam in Hanover County (10 miles), Herring Creek Millpond (9.5 miles) and Gravett's Millpond (4 miles) in King William County which are known to have historically provided anadromous fish habitat are being evaluated, but the RRWSG has not identified the number of miles of stream on which they plan to restore anadromous fish passage.

Intakes for the downstream release of water from the proposed KWR-IV dam into Cohoke Creek would be located at elevations 80, 65 and 45 feet at mean sea level. Each pipe would be sized for a downstream release of up to 4 mgd. The RRWSG's modified proposal is to release an average of 2.5 mgd during normal higher reservoir pool condition and a 1.5 mgd average annual release would be used when the King William Reservoir storage declines to less than 80 percent (which equates to a reservoir pool elevation of approximately 92 feet at mean sea level. These releases would equal about one third of the existing estimated 6.2 mgd average flow at the dam site.

The operation of the reservoir would reduce the net average freshwater flows to the Pamunkey River by approximately two thirds and would affect fish habitat in the downstream portions of Cohoke Creek as well as in Cohoke Millpond. The applicant claims that Cohoke Creek is a minor tributary of the Pamunkey River so the impoundment would not adversely affect it and its fish populations. However, the U. S. Fish and Wildlife service expressed serious concern over the quality and quantity of reservoir water released into the downstream Cohoke Millpond and Pamunkey River. Also, in their 12 March 1996 comments on the Supplement to the DEIS, the National Marine Fisheries Service expressed concern that only one third of the average streamflow would not be sufficient to maintain acceptable fish habitat downstream of the dam.

According to the VDGIF, research has shown that a reductions in stream flow of this magnitude would adversely impact aquatic biota. As they believed the applicant's proposed downstream release would not adequately protect the integrity of fish populations and wetlands in Cohoke Creek, and may significantly impact water levels in Cohoke Millpond, VDGIF recommended that the release be increased to maintain median monthly flows. They also recommended release of 75% epilimnetic water between June and October to prevent temperature shock and oxygen depletion that could stress and kill fish and recommended that temperature and dissolved oxygen be monitored below the dam. A condition of DEQ's water quality permit requires monitoring for temperature, dissolved oxygen and pH below the release point from the King William Reservoir.

The Pamunkey Tribe operates a shad hatchery on the Pamunkey River about three miles upstream of Cohoke Creek. Reduced flows from Cohoke Creek should not have a significant effect on flows in the Pamunkey or York Rivers, but the combined reduction in freshwater input to the Mattaponi and Pamunkey Rivers due to the project could be substantial. I agree with the U.S. Fish and Wildlife Service's concern that "The potential of saltwater intrusion to decrease the tidal freshwater zone of

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spawning habitat on the Pamunkey and Mattaponi Rivers could seriously impact populations of American shad and striped bass.” as expressed in their 28 March 1996 comments on Supplement to Draft EIS.

k. Monitoring Plan: The Norfolk District determined that monitoring would be necessary in order to identify potential negative impacts of the proposed impoundment, intake structure and 75 mgd withdrawal and to develop plans to ameliorate any detrimental impacts if a permit were issued. A panel of experts was convened in a cooperative effort to develop monitoring protocols that would effectively analyze pre and post-withdrawal environmental conditions in the Mattaponi River and allow modification of in-stream conditions should tests indicate that there had been an impact. Likewise, monitoring protocols were developed to analyze pre and post-dam construction conditions in Cohoke Creek and allow modification of downstream releases should tests indicate that adverse impacts had occurred. This effort identified the factors that need to be monitored, but does not constitute a plan to rectify any detrimental impacts to the environment that might be identified as a result of the monitoring. The goals were to determine the effects of the project on the River, and to gather information that would be useful in solving problems related to the health and welfare of the biota. The information would also provide baseline data so that permit changes may be undertaken in a timely manner should problems or concerns be raised during the monitoring period. The Corps believes that the conditions in the specific monitoring plans would provide valid information and allow modification of both in-stream and downstream conditions should tests indicate that there has been an impact.

An interagency task force was established to develop consistent and acceptable monitoring conditions for the Mattaponi River and Cohoke Creek. The following individuals participated in the task force: Dr. Albert Kuo and Dr. Carl Hershner from the Virginia Institute of Marine Science, Don Schwab and Tom Wilcox from the Virginia Department of Game and Inland Fisheries, Dr. Patrick Megonigal and Dr. Arlene Darke, from George Mason University, Garrie Rouse of Rouse Environmental Services, Inc., Dr. Greg Garman of Aquatic Resource, LLC, Dr. Charles Gowan of Randolph Macon College, Sandra Erdle, Lesa Berlinghoff and Steven Carter Lovejoy from the Virginia Department of Conservation and Recreation/Division of Natural Heritage, Bob Unnasch and Judy Dunscomb of The Nature Conservancy, Joe Hassell from the Virginia Department of Environmental Quality, Janet Norman from the U.S. Fish and Wildlife Service, Regina Poeske from the U.S. Environmental Protection Agency, Pamela Painter and Ken Kimidy of the U.S. Army Corps of Engineers, David Morris from Newport News Waterworks, and Bruce Aitkenhead and Rebecca Dorsey of Malcolm Pirnie, Inc.

The group developed a list of physical, chemical and biological issues which needed to be addressed in a monitoring plan for the project. The issues were separated into vegetation, water quality/water quantity, and fisheries and wildlife impacts. Drs. Hershner, Megonigal, Darke, Garman, and Gowan submitted draft monitoring reports which outlined specific concerns raised by the members of the river monitoring task force. Annual reporting required as a condition of a Corps permit would be drawn from this data and all task force members would be able to access the raw data for comparison. Review of the data would be undertaken yearly and any anomalies in the data would result in the task force meeting to discuss the issues and attempt to modify conditions to correct any apparent problems with either downstream releases or MIF conditions. The group agreed that monitoring should be undertaken even during the period where the reservoir was being filled. The group also discussed certain testing requirements which could be undertaken to simulate a worst case analysis prior to the final river conditions being set by the permitting agencies.

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(1) Wetland Vegetation: A study was proposed that would evaluate processes affecting freshwater wetlands from the perspectives of the watershed (macroscale), floodplain (mesoscale), and individual marshes (microscale). The use of field studies, remote sensing and Geographic Information Systems (GIS) is necessary in order to focus on the changes in freshwater flows resulting from water withdrawal. The review of changes in salinity, specifically soil pore water salinity, sediment loads, and the effects on marsh geomorphology and substrate availability for plants would be undertaken in order to assess the changes in ecosystem functions. Through the monitoring of soil pore water salinity, soil deposition/erosion rates, plant community composition, and peak season cover and biomass, the study would provide early indications of salinity stress. Details of the monitoring study can be found in the Monitoring Plan for the Mattaponi River: Wetland Vegetation submitted by Dr. Arlene Darke and Dr. Patrick Megonigal.

Potential impacts from erosion and accretion of the shoreline, long-term salinity changes and the introduction of invasive species on populations of sensitive joint-vetch in the vicinity of the proposed Mattaponi River intake were of concern to the monitoring team members. However, as formal consultation under Section 7 of the Endangered Species Act was being undertaken simultaneously with the development of monitoring conditions, the development of monitoring protocols for the sensitive joint-vetch by the monitoring team would have been premature. Any conservation recommendations made by the U.S. Fish and Wildlife Service to minimize adverse effects to the sensitive joint-vetch colonies would be considered for inclusion as conditions of the Corps permit.

(2) Impingement and Entrainment: Dr. Gowen provided an overview of entrainment and impingement concerns for water supply intakes. The goal of this research would be protection of fish within the waterway through preventing impingement (fish or eggs being stuck to the screen), prevent entrainment (fish or eggs being sucked through the screen), and to get the fish away from the facility. Design considerations must include the screen size, location, and orientation, the velocity characteristics of the intake, the approach velocity to the screen (must be slower than the fishes sustained swimming speed), and the sweeping velocity which allows the eggs or fish to move away from the facility. All pipes and screens must be smooth, with no ragged edges, in order to decrease or eliminate the descaling or injury of the passing fish. The plan for cleaning or blowing out the system must include protection of the eggs and fish in the vicinity during the cleaning activity. Monitoring is an important criterion in assessing the success of the exclusion at the intake site. In order to detect potential concerns, the sweeping and approach velocities need to be measured 3-6 inches in front of the screen and potential hot spots (high approach velocities or low sweeping velocities) must be corrected through baffles or angle shifts in the structure. There are several tests that can assess successful avoidance including releasing marked fish upstream of the facility and recapturing them below the intake to evaluate passing efficiency and mortality rates. Predators are also a problem at intake locations due to the creation of eddies which may capture smaller fish that are not capable of sustained bursts of speed to escape the area. Tidal flows may help sweep the fish and eggs across the screens but may also create unacceptable conditions during slack tide. Consideration should be given to monitoring at the worst case scenario for fish and eggs in order to predict the periods of greatest impact.

Dr. Gowen developed a draft monitoring plan to document the magnitude of potential impacts resulting from intake operation on the Mattaponi River. The study would also provide early notification should there be unacceptably high impingement or entrainment losses in order to allow rapid modification to project design or operation to reduce the impacts. As part of the project development, all screens must be examined prior to installation to insure that the 1-mm screen size is universal across the screen. In

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addition, once the screens are installed, they must be inspected underwater to insure they are not damaged and that all joints and seals are intact. The approach velocities (perpendicular to the screen surface) and the sweeping velocity (parallel to the screen surface) must be measured at several (12) points along each cylinder to determine if the intakes are operating properly and appropriate baffles are installed should faster conditions be found. Sampling protocols are specifically outlined in the plan submitted by Dr. Charles Gowen.

(3) Fisheries: The fisheries monitoring plan proposes to use quantitative data to analyze key ecological components of the fishery assemblage, evaluate the temporal trends and spatial patterns of fish abundance, community structure, and habitat quality associated with the intake structure. Utilizing a paired synoptic design, the study would include the adjacent and ecologically similar Pamunkey River to prevent observed changes in the Mattaponi River after intake operation to be attributed incorrectly or prematurely to the withdrawal. If statistically significant changes not attributable to natural variability are found, further study will be undertaken to determine the causal effect of the change and proposed changes to the withdrawal patterns would be developed. Direct effects associated with anadromous species and temporal and spatial patterns of the entire fish assemblage would be analyzed in the study as well as indirect effects such as growth rates of the target species. The specific information related to the fisheries study can be found in the Fisheries Monitoring Plan for the Mattaponi River submitted by Dr. Greg Garman.

(4) Water Quality: The Virginia Institute of Marine Science submitted a proposal to monitor water quality parameters, including: total particulate carbon, dissolved organic carbon, total particulate nitrogen, total dissolved nitrogen, ammonium nitrogen, nitrite-nitrate nitrogen, total particulate phosphorus, particulate inorganic phosphorus, total dissolved phosphorus, dissolved phosphate, particulate inorganic silica, dissolved silica, Chlorophyll 'a'/phaeophytin, chemical oxygen demand, and dissolved oxygen. The monitoring plan proposes the collection of data from the mouth of the York River, the confluence of the Pamunkey and Mattaponi Rivers, and from the freshwater/salt water transition within both of these rivers. Sampling protocols are outlined in the proposal submitted by VIMS.

(5) Cohoke Creek Monitoring: Since riparian wetlands are defined by hydroperiods that determine the plant community composition, dam operations will influence the hydrologic regime of the downstream wetlands by reducing the variability of the stream discharges. This change could have a major influence on ecosystem functions. Megonigal and Darke developed a paired monitoring design utilizing Totopotomoy Creek as a control in order to infer that the trends observed in Cohoke Creek only represent the effects of the reservoir while simultaneous trends observed in both creeks represent more widespread influences. The use of Totopotomoy Creek was proposed because DEQ utilized Totopotomoy Creek as a surrogate for Cohoke Creek to estimate stream flow rates. Monitoring of Cohoke Creek must be undertaken prior to any reservoir construction and calibrated with stream flow on Totopotomoy Creek. Flow rates, channel contour, peak season percent cover and vegetation composition, and water depths within the wetland system would be monitored to determine relative changes within the downstream watershed.

(6) Final Coordination Requirements: These monitoring plans were presented and discussed with representatives of the Pamunkey, Upper Mattaponi and Mattaponi Indian Tribes during a 24 September 1998 meeting with Norfolk District representatives. District staff discussed the process by which the various monitoring plans were developed and how the concerns of the tribes were taken into consideration in their development.

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In their Virginia Water Protection permit, the Virginia Department of Environmental Quality required the development of a detailed eco-monitoring plan within 24 months of issuance of the permit on 22 December 1997 to identify spawning and nursery grounds of the Mattaponi River used by anadromous fish. To date, the District has not seen such a plan. Also, as part of their proposed mitigation for impacts to Traditional Cultural Properties, the City of Newport News offered to provide financial assistance to the Mattaponi and Pamunkey Tribes to upgrade their existing fish hatcheries.

In the event that a permit were issued for the project, the District, in consultation with state and federal advisory agencies, would have to resolve any outstanding concerns regarding the monitoring studies (e.g., exact sampling locations). Additionally, the applicant would have to provide sufficient assurances that financial resources are available to perform the needed monitoring over the long-term, and to fund any needed corrective actions. In the event that monitoring reveals that changes in the operation of the intake and reservoir are needed to prevent degradation to the aquatic environment, the District Commander may modify the conditions of the permit in accordance with 33 CFR 325.7 to require such actions as greater downstream releases or the withdrawal of less water from the Mattaponi River. (For a detailed discussion of the development of monitoring protocols, see the District's report entitled "Monitoring Study Development for Impacts of the Proposed King William Reservoir and Mattaponi River Intake.")

I. Aesthetics:

(1) Mattaponi River: In their document entitled "Management Plan and Chesapeake Bay Virginia National Estuarine Research Reserve System", VIMS placed the Mattaponi River among the most pristine rivers on the east coast. The Virginia Department of Conservation and Recreation, Natural Heritage Division has indicated that the Mattaponi River supports a system of state significant and exemplary freshwater tidal marshes and swamps that provide high diversity habitat for both common and rare species. The Nature Conservancy has also identified the Mattaponi River as a national wetland priority under its National Wetland Conservation Program. The river possesses natural scenic beauty in its sloping forested terrain and relatively undeveloped shoreline. No major urban or industrial development occurs on the river and it currently exhibits excellent water quality and experiences only minor consumptive uses.

According to the 1996 Virginia Outdoors Plan, a segment of the Mattaponi River from Mundys Bridge on Route 628 to the Walkerton Bridge on Route 629 has been evaluated and qualifies as a Virginia Scenic River. Also, the state has determined that segments of the Mattaponi River in King William County and King and Queen County from Route 628 to Mundys Bridge and from Aylett to West Point should be evaluated to determine their suitability as a Virginia Scenic River.

The Mattaponi River was also designated in 1998 as one of the 20 most endangered rivers in the U.S. by American Rivers, a national river conservation group, because of the threat to the river's ecological integrity from the proposed RRWSG water supply plan. The middle to lower Mattaponi River has also been listed as a probable candidate for meeting the DEQ criteria for nomination to the Exceptional Waters program, which affords special protection to the most unique and sensitive waters in Virginia. Along with the Pamunkey River, portions of the Chickahominy River, and some creeks of the Rappahannock River, the Mattaponi River is described by The Nature Conservancy as "the heart of the most pristine freshwater complex on the Atlantic Coast." As there are no existing impediments, the Mattaponi River currently provides spawning habitat for anadromous fish species along its entire length.

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The Mattaponi Tribe has a unique cultural perspective of the Mattaponi River that goes beyond aesthetics. The Mattaponi people believe that the Mattaponi River is more than a simple body of water. To them, it is a spiritual place that unites tribal members through baptism and other religious ceremonies. The Mattaponi Tribe claims that alterations to the natural state of the river would compromise the sanctity of these religious ceremonies. They believe that the river is a gift of life from the Great Spirit that provides and completes the circle of life. The Tribe believes that to defile the Mattaponi River would be to dishonor the Tribe's ancestors and Mother Earth.

The intake pump station structures and the surrounding cleared areas would disrupt the pristine nature of the shoreline when viewed from the river. Construction activities would temporarily increase noise levels, and the pump station operation would result in a long-term increase in ambient noise levels. The applicant proposes to implement architectural and landscaping treatments that would minimize pumping noise and visual impacts.

(2) Cohoke Creek: Cohoke Creek is a tributary to the Pamunkey River. According to the 1996 Virginia Outdoors Plan, a segment of the Pamunkey River from Norman's Bridge on Route 614 to the Pampatike Landing near the Route 360 Bridge has been evaluated and qualifies as a Virginia Scenic River. Also, the state has determined that segments of the Pamunkey River from the King William County/Caroline County line to Route 614 and from Pampatike Landing to the York River should be evaluated to determine their suitability as a Virginia Scenic River.

The upland forests, hardwood swamps, emergent wetlands, streams and beaver ponds of the Cohoke Creek watershed possess natural scenic beauty. The area is relatively undisturbed except for silvicultural activities. A dramatic shift in the scenic character of the area would occur from the replacement of this forest/wetland system with a deep-water man-made lake. However, because aesthetic values vary with individual taste, some people may consider the new open-water habitat as an aesthetic resource.

Upon completion of construction, the dam area would be landscaped to minimize visual impacts. Short-term water quality and air quality impacts would occur during land clearing and construction disturbances. Construction activities and transportation of workers and materials to the site would increase noise levels at the reservoir project site. A long-term increase in ambient noise levels would result from the operation of the reservoir pumping station. Odor should be a problem only when the reservoir is severely drawn down and anaerobic sediments are exposed.

m. Historic Resources and Traditional Cultural Properties: Under Section 106 of the National Historic Preservation Act (NHPA), federal agencies are required to take into account the effects of an agency's undertakings on properties included in or eligible for the National Register of Historic Places (National Register). The goal of the Section 106 consultation process is to identify historic properties potentially affected by the undertaking, assess its effects, and seek ways to avoid, minimize or mitigate any adverse effects on historic properties. Historic properties which are issues for this project include pre-historic and historic archaeological sites, historic structures and Traditional Cultural Properties (TCPs). TCPs are defined in National Register Bulletin Number 38, "Guidelines for Evaluating and Documenting Traditional Cultural Properties" as historic properties that are eligible for inclusion in the National Register because of their association with cultural practices or beliefs of a living community that are rooted in that community's history, and are important in maintaining the continuing cultural identity of the community. Since the historic property review for this project also involved a minority population

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of Native Americans, Environmental Justice is an interrelated issue, which is discussed in detail in Section 8 t. below.

(1) Archaeology and Architectural Resources: As part of the NEPA review of the project, and as required by Section 106, the RRWSG contracted with MAAR Associates, Inc. to undertake a Phase 1A cultural resource survey, which was conducted in the summer of 1993. A report entitled, "Phase IA Cultural Resource Survey for the Proposed King William Reservoir, King William County, Virginia and the Proposed Black Creek Reservoir, New Kent County, Virginia", was finalized in January 1994 and was included in the Draft EIS as Appendix G. This survey identified 15 previously unrecorded cultural resources in the King William Reservoir project area, and recommended additional research in the form of "Phase IB" intensive systematic field survey. In the summer of 1994, MAAR Associates performed a Phase IB survey of the 2,400-acre King William Reservoir site (a survey of the KWR-I pipeline route was conducted in 1996). A report entitled, "Phase I Cultural Resource Survey for the Proposed King William Reservoir, King William County, Virginia", dated October 1996, documented this archaeological survey, and was included in the FEIS (January 1997) as Appendix G. The survey was performed for KWR-I and found a total of 156 archaeological sites. Of the 156 sites located for KWR-I, eight were outside the impact area, five were located at the site of the pump station and intake pipeline, 19 were located along the outfall pipeline, and 124 were located within the proposed reservoir impoundment. For KWR-IV this survey identified a total of 115 archaeological sites within the area of potential effect (92 in the reservoir, 18 in the outfall pipeline route and 5 at the pump station and along the intake pipeline). Of the 115 total sites for KWR-IV, 72 sites were determined to be potentially eligible for inclusion in the National Register of Historic Places (55 prehistoric archaeological sites within the KWR-IV pool area, 12 sites along the pipeline route and five sites at the intake location). Most of the archaeological sites (120, out of the total of 156 sites identified) were Native American sites, which were temporary hunting/gathering camps or base camps from the Early Archaic period through the Late Woodland Period. In addition to the Native American sites, 43 of the 156 sites had a Euro-American component ranging from the seventeenth through the twentieth century, with most sites falling into the farmstead and/or dwelling category. Industrial or extractive sites included a dam and mill, several ice house pits and a dam and ice house pit complex. This report also discussed architectural resources, and noted that 53 survey forms were completed. Although none of the architectural resources are located within the reservoir pool, a total of 17 properties were considered to possibly be affected visually by the reservoir. It should be noted that the pipeline route surveyed was for KWR-I, and that roughly 21,000 linear feet of the proposed pipeline route for KWR-IV was not surveyed in the Phase I.

In April 1997, the Virginia Department of Historic Resources (VDHR) submitted comments on their review of the October, 1996 Draft Phase I Cultural Resource Survey. VDHR concurred with the majority of the recommendations in the report for the sites identified; however, they recommended further work on 20 sites, disagreed with the need for further evaluation on 5 sites (based upon total of 156 sites), and suggested that adjacent sites with the same components need to be evaluated for possible relationships. They also had concerns about effects to archaeological sites located outside the reservoir pool and KWR-I pipeline corridor (i.e., mitigation sites, KWR-IV pipeline route), and provided comments on suggested modifications to the report. The letter also recommended that the District initiate three party consultation pursuant to Section 106 of the NHPA. The draft version of the Phase I Cultural Resources Survey report has not been rewritten into a final version; therefore, VDHR comments are not incorporated as part of the draft Phase I report.

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(2) American Indians: The reservoir would be located in a rural area of King William County, between Virginia's only two American Indian Reservations: The 150-acre Mattaponi Reservation on the Mattaponi River with approximately 65 residents (approximately 450 other tribal members do not live on the reservation) and the 1,200-acre Pamunkey Reservation on the Pamunkey River with approximately 75 residents. In addition, the Upper Mattaponi Tribe, although not reservated, has tribal lands (Indian View Baptist Church and Sharon Indian School on two acres and another 30-acre tract nearby) in King William County. These American Indian Tribes are descendants of Native peoples whose archaeological remains date back thousands of years, and are also all descendants of the Powhatan Indians of Eastern Virginia. The Powhatan Indians were distinct ethnic communities (tribes) of Native Americans who were united under the rule of a seventeenth-century paramount chief named Powhatan (the father of Pocahontas). The Great Chief Powhatan led the Powhatan Confederacy and ruled most of tidewater Virginia when English colonists arrived in 1607. The present day reservations were originally established by an act of the Virginia General Assembly in 1658 from land long held by the Tribes and are believed to be the oldest in the United States. Despite 17th century treaties, the reservation boundaries have decreased in size due to European colonization and encroachment. All three tribes were recognized by the Virginia legislature in 1983; however, none of them are federally recognized. (These Tribes have been seeking recognition from the federal government as sovereign nations; however, in January 2001, the Mattaponi and Pamunkey Tribes withdrew from this effort for undisclosed reasons.) Despite the lack of federal recognition, the Norfolk District has made every effort to keep the Tribes informed and to involve them where appropriate. In fact, on 25 February 1998, my predecessor, Colonel Robert H. Reardon, Jr. signed a Memorandum for the Record regarding the Mattaponi and Pamunkey Tribes. The memo stated, "This is to memorialize for the record my decision of 7 March 1997 to treat the Mattaponi and Pamunkey Tribes as if they were federally recognized Tribes, to the extent that I am permitted to do so by applicable statutes and regulations."

The Pamunkey Tribe became involved in the project in its very early stages. The Pamunkey Tribe first contacted the consultants who were working on the project in December of 1990 with a letter stating that they were "concerned about the possible effects to archaeological sites which include human remains located in the project vicinity" and indicated that they wanted to be an "interested party" in the consultation process. Mr. Warren Cook, Assistant Chief of the Tribe, was hired to assist in the archaeological studies. At the time, the Pamunkey Tribe represented not only their Tribe, but also the United Indians of Virginia and the Mattaponi Tribe (per letters of September 1993, and November 1993 from the Pamunkey Tribe). However, the Mattaponi Tribe later decided to represent itself. The first piece of correspondence regarding this project from the Mattaponi Tribe was a letter in March, 1994 from the Mattaponi Chief and Councilmen to the County Administrator of King William County requesting that the project to withdraw water from the Mattaponi River cease and be dismissed. They stated that the native people do not wish to see the ecology of the Mattaponi River disturbed or destroyed. In September of 1996, the District was contacted by the Mattaponi Tribe and informed that the chief, assistant chief, and tribal council were the only official representatives of the Mattaponi Indian Reservation to comment concerning the reservoir matter. The Mattaponi Tribe became very involved in the process from that point on and hired the Institute for Public Representation (IPR), a nonprofit, public interest law firm, to represent them. The Upper Mattaponi Tribe did not become involved until 1997 after accepting an invitation from the District to participate as a consulting party in the MOA process.

(3) Public Involvement and Comments: In addition to working with the Tribes, the District involved the general public in the Section 106 process for this project in many ways, including public notices, EIS documents and a public hearing (see Section 5 for details). Comments on the Draft,

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Supplement to the Draft and Final EIS documents related to cultural resources were received from various parties, including; the Environmental Protection Agency, Virginia Department of Environmental Quality, Pamunkey Tribe, Mattaponi Tribe, Virginia Council on Indians, National Trust for Historic Preservation, Sierra Club, Chesapeake Bay Foundation, West Point Hunt Club Inc., Alliance to Save the Mattaponi, Mattaponi and Pamunkey Rivers Association, King William Historical Society, and King and Queen County.

The letters discussed several issues including: the need to address the likelihood or presence of Traditional Cultural Properties (TCPs), the need for further consultation with the affected Tribes, violation of treaties with the Tribes, and impacts to anadromous fish used by the Tribes. The Pamunkey Tribe and IPR, on behalf of the Mattaponi Tribe, submitted comments on the FEIS, and announced their opposition to the project. The letter from the Pamunkey Tribe also indicated that the United Indians of Virginia were opposed to the project. The letter from IPR on behalf of the Mattaponi Tribe claimed that the District could not issue a section 404 permit for the proposed King William Reservoir project because it violates the Mattaponi Tribe's aboriginal hunting, fishing and gathering rights, it abrogates the Tribe's 1646 and 1677 treaties, and issuance of the permit would violate the Corps' trust responsibility to the Tribe. The letter described the historical background of the Tribe and the many traditions and cultural practices that are still part of Tribal life (i.e., hunting, fishing for subsistence, spiritual traditions that involve the Mattaponi River such as baptisms and Easter services). This letter also indicated that the District did not adequately evaluate the environmental justice consequences of the project; the applicant failed to show that the project would meet the requirements of section 404; the FEIS was inadequate under the requirements of NEPA; and the FEIS failed to address the following potential impacts: potential threat of dioxin contamination, salinity levels in the Mattaponi River and on the shad population, terrestrial habitat and wildlife, and impacts to the Tribe from lost archaeological sites. The Pamunkey Tribe's comments on the FEIS included the following items of concern or objections: adverse effect of the project to archaeological resources, potential impacts to burial sites, inadequate discussion of environmental justice issues, failure of the Commonwealth of Virginia to live up to its trust responsibilities and safeguard the Tribes, inadequacies in the proposed wetland mitigation plan, loss of wetlands and uplands, and potential impacts to the Mattaponi and Pamunkey Rivers. They stated that if the project was permitted they wanted to participate in and be compensated for the archaeological investigations and they wanted the best mitigation plan available.

(4) Traditional Cultural Properties: During the preparation of the FEIS, the District staff learned from the VDHR and the ACHP that there was a need to assess potential impacts to TCPs. Prior to this time, the focus on cultural resources had been on gathering information on potential impacts to archaeological and architectural properties. However, once the District staff was made aware of the need to address TCPs, and the Tribes provided comments on the EIS documents, the District began to meet with the Tribes, VDHR, EPA, ACHP, and the applicant to determine how to address this issue. At the invitation of the Pamunkey and Mattaponi Tribes, former District Commander Colonel Robert H. Reardon, Jr. and several District staff members visited their Reservations in March of 1997. After I assumed command, I also visited the Mattaponi reservation in September 1998.

(a) Consulting Parties: In response to the District public notices and EIS's, several parties became interested in the Section 106 process and requested participation as consulting parties. Over the course of several months, various parties were added as consulting parties, with the most recent list including: the District, VDHR, ACHP, City of Newport News, EPA, Mattaponi Indian Tribe (also represented by the Institute for Public Representation), Pamunkey Indian Tribe, Upper Mattaponi Tribe,

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United Indians of Virginia, Virginia Council on Indians, King William County, Preservation Alliance of Virginia, National Trust for Historic Preservation, and Southern Environmental Law Center. These parties were included in meetings and mailing lists on issues related to the various cultural resource issues.

(b) TCPs and Environmental Justice: After consultation with the VDHR, ACHP and EPA, the District determined that potential impacts to TCPs and Environmental Justice should be addressed through a study conducted by a qualified ethnographer. The District conducted a meeting of the consulting parties to develop a Scope of Work which would guide the ethnographer in the research of the cultural and spiritual issues related to TCPs. The Scope of Work was finalized in November of 1997. The first ethnographer contracted to perform the study was Dr. Helen Rountree, an anthropologist/ethnohistorian and Professor at Old Dominion University who had studied the Pamunkey, Mattaponi and Upper Mattaponi Tribes for many years. However, in January 1998, due to her unexpectedly large class load, she declined to perform the study. Dr. Kathleen Bragdon, a cultural anthropologist with the College of William and Mary was then selected as the principal investigator for the TCP study, which was begun in the spring of 1998. The TCP study was funded by EPA.

(5) Memorandum of Agreement: While the TCP study was being conducted, the District continued to work on other aspects of the project related to cultural resources. Since the City of Newport News declined to perform the Phase II (evaluation of significance) on the archaeological sites prior to a permit decision, it was determined that a Memorandum of Agreement (MOA) would need to be developed to specify measures to avoid, reduce or mitigate adverse effects on historic properties that are eligible for the National Register. It was known that there were 115 archaeological sites, 72 of which were potentially eligible for the National Register (79 as recommended by VDHR), possible visual impacts to potentially eligible architectural properties, and the issue of the presence of a rural historic landscape. It was clear that the project would have an adverse effect on historic properties. Numerous meetings were held with the various consulting parties to develop an MOA. The stipulations of the draft MOA included: Coordination of Reviews, Identification and Evaluation (archaeological sites, TCPs, standing structures, and rural historic landscapes), Consultation and Treatment (archaeological sites, TCPs, standing structures, and rural historic landscapes, curation of archaeological materials, human remains and associated artifacts), Discovery Provisions, Public Involvement, Dispute Resolution and Administrative Provisions. It was recognized that the identification of all historic properties would not be completed until after execution of the MOA, and that there were still areas that would need identification surveys for historic properties (i.e., the outfall pipeline route, wetland mitigation sites, staging areas for construction equipment). Therefore, the purpose of the MOA was to address what actions would be taken to resolve the adverse effects of the reservoir project on historic properties. Treatment plans for particular archaeological sites were to be developed after further investigations and eligibility determinations were completed.

There was much concern by the Tribes about the recovery of archaeological materials, and especially, human remains. Although no burials were located during the Phase I identification survey, more extensive excavations at the Phase II survey level could reveal the presence of human remains. After much discussion, it was determined that if the project was constructed, archaeological materials would be permanently curated by VDHR; however, all Native American artifacts would belong to the Tribes. It was decided that American Indian skeletal remains and associated artifacts, would be reinterred as determined by and in a location as agreed upon by the Pamunkey Tribe, the Mattaponi Tribe, the Upper Mattaponi Tribe, in consultation with the United Indians of Virginia and the Council on Indians. It

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should be noted that not all parties concurred with the stipulations in the draft MOA. In particular, the Mattaponi Tribe stated that they could not accept plans to disturb burial sites of their ancestors and suggested that the MOA should state that human remains would be left undisturbed by reconfiguring the project design.

Another issue of concern was related to the archaeological sites that were not recommended for further work either in the Phase I report, or by VDHR. The treatment of these sites was determined to be independent of the Section 106 review since they were not considered “potentially eligible” for the National Register. However, the Mayor of Newport News had made a commitment to the Tribes in March of 1997, stating, “the City does hereby commit to investigation of all 92 cultural resource sites found within the flooded area of the proposed smaller reservoir (dam site IV).” The treatment of these sites was included as a “Whereas clause” in the draft MOA, and attached as a separate document. Mitigation for TCPs also needed to be included in the MOA, but this could not be accomplished until after the TCP report was finalized and discussions with the Tribes were conducted.

(6) “Powhatan’s Legacy”: The first draft of the TCP report, “‘Powhatan's Legacy’: Traditional Cultural Property Study for the Proposed Regional Raw Water Study Group's Water Supply Reservoir, King William County, Virginia” (“Powhatan's Legacy”) was received by the District in August, 1998. As had been agreed, the report was sent to the Pamunkey, Mattaponi, and Upper Mattaponi Tribes for their review. In addition, since the Tribes had requested confidentiality of the report, the District wrote to the National Park Service (NPS) in August, 1998 requesting the concurrence of the Secretary of the Interior that public disclosure of the TCP report would cause a “significant invasion of privacy” pursuant to Section 304 (a) (1) of the NHPA. The NPS responded in January of 1999 that they could not concur with our intention to withhold the report from public disclosure pursuant to Section 304. The NPS concluded that based upon available information, they did not see how the public release of the report would cause significant invasion of privacy, risk harm to historic resources, or impede the use of traditional religious sites. However, the District agreed to honor the Tribes request for confidentiality to the maximum extent provided by the Freedom of Information Act (FOIA). Due to the necessary Section 106 coordination, certain parties (Tribes, ACHP, VDHR, EPA, and the City of Newport News) were afforded an opportunity to review and comment on the “Powhatan's Legacy” report. The second draft of the TCP report, received in October of 1998, was made available in January of 1999 to the parties mentioned above.

(a) Newport News Comments on TCP Report: The City of Newport News reviewed the draft TCP report at the District offices in January 1999 and sent in a letter which questioned the validity of the report, due to a perceived bias. They stated that some of the chapter summaries and other parts of the report appeared to describe the opinions and beliefs of the investigators, rather than Indian Tribes or individuals, as to effects of the reservoir project on TCPs and on Virginia Native Americans in general. They also questioned whether Dr. Danielle Moretti-Langholtz, one of the contributors to the TCP study, was able to separate her personal views from her professional duties in the conduct of the TCP study, and mentioned her March, 1997 personal letter to the District commenting on the FEIS before she was involved in the study. Due to the high volume of letters received against the reservoir and the length of time between receipt of her person letter and her appointment by Dr. Bragdon as a contributor to the investigation, the District staff did not make the connection. The City of Newport News' letter urged the District to carefully consider the extent to which the TCP report was tainted by the biases and pre-judgments of one of the principal authors. As a result of Newport News' letter, VDHR commented that

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because Dr. Moretti-Langholtz's comment letter creates the appearance that the report might be biased, the District should "...take steps to strengthen the perception of objectivity" of the report.

Therefore, the District conducted a full investigation of the validity of the alleged bias. Both Dr. Kathleen Bragdon and Dr. Moretti-Langholtz responded in writing to the Newport News allegation and met with me and my staff to discuss the report. Because EPA had funded the study, they initially suggested their archaeologist, John Vetter to review the TCP report; however, he declined to perform the work. Mr. Timothy Thompson, a Norfolk District Corps of Engineers archaeologist, was tasked to review the TCP report. Both VDHR and ACHP were consulted and neither objected to the District's selection of Mr. Thompson to perform this review. Mr. Thompson concluded that reliable data was gathered using a standard anthropological methodology and the conclusions of the researchers were consistent with the data. I am satisfied that Dr. Moretti-Langholtz acted in a professional manner and did not allow any personal views about the reservoir project to influence the work she performed for the District. Therefore, in April 1999, I wrote to Newport News stating that I had concluded my review of the matter and determined that the allegation of bias was unwarranted. I informed the City that I was satisfied that I could use the report to make a fair and informed evaluation of the effects of the project on TCPs.

(b) Other Comments on TCP Report: Comments on the "Powhatan's Legacy" report were also received in March 1999 from ACHP, VDHR, the Pamunkey Tribe and IPR, on behalf of the Mattaponi Tribe. IPR stated that they commended the overall comprehensiveness of the draft report, but believed that some important issues were not discussed. They made the following suggestions: inclusion of traditional cultural uses of Cohoke Valley wetlands, treatment of the entire Cohoke Creek area as an historic district, and the preparation of a supplemental questionnaire. The Pamunkey Tribe stated that the use of wetlands has always been a significant part of the way of life of the Pamunkey People and provided information on the significance of fishing and the Pamunkey Fish Hatchery to their culture. They also submitted a document entitled, "Searching for Virginia Company Period Sites: An Assessment of Surviving Archaeological Manifestations of Powhatan-English Interaction, A.D. 1607-1624, Study Unit 10: Gloucester, King and Queen, and King William Counties", for inclusion in the TCP report.

ACHP stated that in general they found the TCP Report helpful, but recommended that the final report provide further detail on how traditional cultural properties would be affected by the reservoir, and what kinds of measures may be needed to mitigate against adverse affects. VDHR stated that their archaeology subcommittee of their National Register Evaluation Team met to consider the eligibility of the TCPs, and agreed that all five TCPs were potentially eligible. However, they stated that the level of detail was not sufficient for them to determine conclusively that the properties met the criteria for inclusion on the National Register. They recommended further development of property descriptions for the final report. In April of 1999, the District wrote to the TCP author regarding the comments received and recommended several minor additions or clarifications to the report.

(c) Final TCP Report: The consultant submitted the final TCP report, "Powhatan's Legacy" in September 1999, incorporating the applicable comments provided on the draft. The study provided a historical review of the "Powhatan Indians of Eastern Virginia" from the late sixteenth century, and described the present day culture. The authors used both quantitative and qualitative methods to gather data on the Indians' perspective. They conducted formal and informal interviews with individual members of the Mattaponi, Pamunkey and Upper Mattaponi Tribes, and developed a questionnaire, in consultation with the Tribes. The questionnaire was designed to focus questions on the attitudes of the tribal membership and the pertinent cultural lifeways which could be most directly impacted by the

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reservoir project. A total of 98 questionnaires were returned: 51 individuals from the Mattaponi, 19 families from the Pamunkey and 28 individuals from the Upper Mattaponi.

The report identified five Traditional Cultural Properties: the Pamunkey River and its wetlands; the Mattaponi River and its wetlands; the Pamunkey Reservation including the Pamunkey Fish Hatchery; the Mattaponi Reservation including their Shad hatchery; and all potentially National Register-eligible archaeological sites within the project area associated with the Powhatan peoples. These TCPs are argued as part of the larger ethnographic landscape of the Pamunkey Neck, which has a distinctive rural character. The Pamunkey and Mattaponi Rivers are described as vital to the Tribes for subsistence, and essential to their historical and cultural identity, and the Mattaponi River is considered the “lifeblood” of the Mattaponi community. In regard to the Mattaponi and Pamunkey Reservations, the TCP study reported that they are the only two Indian reservations in Virginia, “and of less than a dozen surviving reservations in the eastern United States.” The report concluded that the reservations are valued for their historic and cultural associations and as the center of Indian life for each Tribe. The archaeological resources were previously researched during the Phase I survey; however, the TCP report stated, “their (Native American archaeological sites) importance to the Native community goes beyond what their excavation might tell us.” The report indicated that the Tribes recognize that the prehistoric archaeological sites provide “a centuries deep connection to the prehistoric occupation of the region,” and that the “Mattaponi specifically note that they do not wish these sites disturbed.”

The research described the Tribes as having a connection to the land and rivers of the Pamunkey Neck that provides an important link to their ancestors as well as a legacy to their descendants. The report stated, “the proposed project is expected to impact the Indian communities, their reservations, and the surrounding buffer area in a number of ways, all of which will have a negative impact on community cohesiveness, and on the historic and cultural character of the TCPs.” These effects include: direct changes in the Mattaponi River and indirect changes in the Pamunkey River and their associated wetlands, which would affect the plant and animal communities and the people that depend on them; changes in the rural character of King William County due to increased recreational and residential use of the rivers and reservoir, and further isolation of the two reservations by the physical barrier of a reservoir; potential impact on future plans of the Mattaponi and Pamunkey Tribes for an expansion of their land base to further protect their heritage; negative effect on the morale and status of the Indian community of Virginia as a whole; and inundation and/or excavation of prehistoric archaeological sites which have great emotional and symbolic significance to the Tribes causing significant disturbance in the Indian community and possibly impacting their quest for federal recognition. The report stated, “...if this project is undertaken it will have harmful effects on the Indian people and their culture. All Indian people we have consulted and surveyed insist that this project should not be undertaken.” The author’s reasons for this recommendation are summarized as follows: the area of potential effect for the proposed reservoir includes the “cornerstone” of surviving traditional native culture in Virginia; changes to the rivers would be irreversible, as would their effects on the Tribes; the area of potential effects contains sites of sacred importance to the Tribes; and the archaeological sites affected by the proposed reservoir are of great cultural and symbolic significance to the Tribes, and most tribal members do not want the sites disturbed. The Tribes would not discuss compensation of the impacts on these TCPs; therefore, the author was not able to include suggested mitigation measures in the report.

(7) Mitigation for Impacts to TCPs: At a meeting with the consulting parties on 1 April 1999, the TCP report was discussed as well as a draft document prepared by the District entitled “Traditional Cultural Properties: Determination of Eligibility and Evaluation of Effects of the King William

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Reservoir” that applied the National Register Criteria to each TCP and listed the potential effects of the project on each TCP. All parties present were asked for their input and the District finalized the document on 6 April 1999 to incorporate these comments. Each TCP was found to meet one or more of the National Register criteria. In accordance with 36 CFR 800 and 33 CFR 325 Appendix C, an historic property will be treated as eligible for the National Register if both the SHPO and District agree that the property is eligible. At this meeting, the District, VDHR, ACHP, Newport News and the Tribes agreed to consider the TCPs “potentially eligible”; however, there was disagreement as to the effects of the project on TCPs. Newport News believed that the effects were “perceived” rather than “real”, and the Tribes firmly believed that the impacts were real. Newport News was very concerned about the need to move the project forward and to discuss potential mitigation measures.

Earlier in the project, Newport News had met on their own with the individual Tribes to try to arrive at an agreement whereby the Tribes would withdraw their objections to the project in exchange for monetary compensation. Although the Upper Mattaponi Tribe seriously considered the City's proposal, none of the Tribes consented to sign such an agreement. In March of 1999, Newport News drafted a proposal to establish the “Powhatan's Legacy Foundation” to “mitigate the adverse effect perceived by the Native Peoples on TCPs associated with the King William reservoir project, and to provide a vehicle for the Tribes to protect and maintain their traditional cultural values.” Newport News proposed to provide 1.5 million dollars to the foundation, to be distributed equally to the three Tribes. As part of the agreement, Newport News proposed certain measures to protect the natural environment, provide ongoing assistance to the foundation, and involve the Tribes in the archaeology research and curation. The Tribes did not accept this proposal, and requested confidential discussions of any mitigation for TCPs with only the essential consulting parties attending the meetings. Therefore, arrangements were made to meet with each of the Tribes individually in May 1999, and the Tribes were requested to provide a list of possible mitigation measures prior to the meetings.

Accordingly, all three Tribes presented a list of potential mitigation measures which they requested to be kept confidential. The Upper Mattaponi Tribe provided their list in April of 1999, and requested that the measures be held in strictest confidence by all parties involved. The Pamunkey Tribe submitted a letter to the District with their suggested mitigation measures for the TCPs in April 1999. The letter stated that the Pamunkey Tribal Government has always opposed and still opposes the proposed King William Reservoir; however, they wanted the best possible mitigation plan if the Corps approved the project. In May 1999, IPR submitted the Mattaponi Tribes' TCP mitigation proposal to the District. The Mattaponi Tribe reemphasized their belief that no measures could ever fully mitigate the adverse effect of the King William Reservoir on the Tribe's historical and cultural resources. The Tribe also indicated that they were only providing the suggested mitigation measures because they felt forced into the situation, and they feared that by not participating, the Tribe would run the risk that the reservoir would be built with no compensatory mitigation. IPR also arranged for confidentiality agreements to be signed by Newport News and the District. I agreed not to divulge the information presented in the mitigation meeting to the extent permissible by law and signed the agreement in May 1999.

On 13 May 1999, meetings were held separately with the Pamunkey and Upper Mattaponi Tribes to discuss possible mitigation measures for impacts to TCPs. The meetings were attended by representatives of the respective Tribes, the District, VDHR, ACHP, EPA, and Newport News. For both of the Tribes, Newport News agreed to review their suggested mitigation, provide a counter offer, and attend a second meeting to discuss the mitigation. On 22 May 1999, a meeting was held to discuss mitigation measures for impacts to TCPs with the Mattaponi Tribe. The meeting was attended by representatives of the

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Mattaponi Tribe, IPR, the District, VDHR, EPA, and Newport News. The Mattaponi Tribe suggested mitigation for impacts to TCPs and Newport News requested cost estimates for some of the mitigation proposals, and indicated they would submit a counter offer. Also at this meeting, IPR read a statement discussing a unique sacred site within the Cohoke valley which is of great traditional and religious importance to the Tribe. The Tribe indicated that they were extremely reluctant to discuss the sacred site with outsiders unless absolutely necessary, and only revealed the existence of it when the Tribe felt it had no choice if the site were to remain undisturbed. The Mattaponi Tribe requested that the District seek protection for the information under Section 304 of the NHPA. The District requested a written statement in order to have something to present to the NPS for protection.

(8) Suspension of Section 106 Coordination: On 4 June 1999, I sent a letter to Newport News to inform them of my preliminary position to deny their request for a Department of the Army Permit to construct the King William Reservoir. With the District's preliminary position of denial, there would be no federal undertaking for further consultation under Section 106; therefore, the Section 106 process was discontinued. Newport News objected to this action and recommended that we continue the discussions of mitigation for TCPs and complete the MOA. In June 1999, Newport News submitted "confidential" counterproposals to each of the Tribes regarding mitigation for the TCPs, and stated that the offer "should be regarded as the City's best and final financial proposal." IPR sent a response for the Mattaponi Tribe stating that the Tribe saw no reason to continue discussing cultural resource mitigation proposals at this time. The Pamunkey Tribe indicated that further discussions of the mitigation should await Newport News' appeal of the final Corps' decision if the permit is denied. The Upper Mattaponi did not respond to Newport News' letter.

(9) Discussion on Appropriate Mitigation Measures: It should be noted that there were substantial differences in the proposals submitted by each of the Tribes and the counteroffers submitted by Newport News. Newport News has made statements indicating that they and the Tribes were close to a resolution on appropriate mitigation measures. However, based upon discussions at the various meetings and statements contained in letters received from all parties, it did not appear there would be concurrence between the Tribes and Newport News. Although there were areas where Newport News and the Tribes agreed (i.e., additional Tribal lands, museums, cultural centers, grantsmanship assistance, etc.), the monetary amounts offered by Newport News were far less than the Tribes requested. There were also several measures requested by each Tribe that Newport News did not agree to fund or incorporate. The monetary differences alone between the Tribe's requests and the offers by Newport News are significant, with all of the Tribes requesting millions of dollars more for mitigation measures than Newport News was prepared to offer.

(10) Sacred Site: On 30 June 1999, IPR submitted a letter on behalf of the Mattaponi Tribe discussing the "sacred site." The District contacted the NPS seeking concurrence that the 30 June letter should be withheld from disclosure to the public pursuant to Section 304 of the NHPA, and in July 1999, the NPS responded that they concurred with our intent to withhold the document from the public. Due to the Tribes' request for confidentiality, and the Section 304 protection provided, the specifics of the sacred site will not be discussed in detail in this document. However, the 30 June 1999 letter is part of the administrative record and will be made available within the Corps' chain of command for decision-making purposes.

The City of Newport News questioned the validity of the sacred site and asked the District to conduct further investigations and consultations on the site. Although there is no historical documentation on the

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specific location of the sacred site mentioned by the Mattaponi Tribe, there are historical records which validate the potential existence of such a site. In addition, conversations with VDHR and ACHP have indicated that oral history in the American Indian culture is very reliable. The District has confirmed with the authors of the TCP report that they learned of the sacred site from more than one individual during their research for the TCP study, but were requested not to include any information on spiritual, religious or ceremonial practices in the report due to concerns that the information might be released to the public. Newport News also indicated in their letter of 21 September 1999 to the NPS that information about the sacred site had already been released by certain members of the Mattaponi Tribe. However, Newport News has provided no evidence that any public statements made were a release of the same type of information or level of detail provided in the 30 June 1999 letter.

The District has accepted the Mattaponi Tribe's statements concerning the sacred site, and has not pursued the validity in depth due to the Tribes' request for confidentiality and the fact that no further Section 106 consultation is necessary at this time. Although the site was not discussed in the TCP study, the District believes it would be considered a TCP, at least as another archaeological site. It should be noted that my preliminary position to deny the permit was made before I had any knowledge of the existence of the sacred site; therefore, it was not the issue that tipped the balance toward my preliminary position of denial as alleged by Newport News. Should it become necessary in the future for the District to continue evaluation of TCPs for permit issuance, further consultation on the sacred site would be necessary.

(11) Rebuttal Reports Submitted by Newport News: In August of 1999, the City of Newport News submitted two reports to the District: "Cultural Resources Issues Summary" prepared in response to the District's 4 June 1999 preliminary denial letter; and "Supplemental Report on Cultural Resources Issues" a confidential report addressing TCP mitigation and attempting to rebut the existence and/or significance of the sacred site.

The "Cultural Resources Issues Summary" did not contain any new information, rather, the report restated the City's position that they have been very accommodating to the Tribes, that any adverse effects resulting from the project could be adequately mitigated, that federal historic preservation laws present no bar to the issuance of a permit, and that mitigation measures have been successfully used in other similar situations. The District agrees that the City of Newport News has been willing to cooperate with the Tribes; however, there were still areas of apparently irreconcilable disagreement between the Tribes and Newport News, with appropriate mitigation measures being one of the most notable issues. Section 106 requires the District to "take into account" the effect to historic resources, and the law does not suggest that projects must be denied based on impacts to cultural resources. However, there is nothing to preclude the denial of a project based partially or wholly on adverse impacts to historic properties. The reservoir project would result in adverse effects on historic properties, an issue that was considered in the combined impacts of the project. Mitigation agreements to compensate for TCP impacts in other projects do not necessarily apply to the proposed King William Reservoir project.

On behalf of the Mattaponi Tribe, IPR submitted a rebuttal to the City's summary report in a letter dated 14 January 2000. The letter stated that the Mattaponi Tribe had not accepted Newport News's proposed mitigation plan and that they believed the District's procedures were in compliance with the Section 106 consultation process. The Tribe restated their belief that the excavation of vital archaeological resources would result in an unacceptable and irretrievable loss to the Tribe, there is a strong likelihood that the project would negatively impact the shad population, the Tribe's traditional hunting and gathering practices would be severely impacted, the Tribe's traditional religious practices and traditional ways of

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life would be compromised, and that there would be disproportionate impacts to Native Americans resulting from the project location. IPR also noted cases where mitigation had been rejected by other tribes due to project impacts.

The City of Newport News' "Supplemental Report on Cultural Resources Issues" contained the same information on the sacred site that the Mattaponi Tribe had revealed to the District and the City at the 22 May 1999 meeting as well as other information on the site, including possible geographic locations. Therefore, the District also sought protection of this document under Section 304 of the NHPA. In a December 1999 letter, the National Park Service concurred with the District's intention to withhold this document as well.

On behalf of the Mattaponi Tribe, IPR submitted a response to the City's Supplemental Report on November 30, 2000. Without revealing any details about the site, the following summarizes the two documents. Newport News alleged that the Mattaponi Tribe revealed the sacred site as "a last-ditch attempt to promote the particular agenda of the Tribe and its allies." However, the Mattaponi contend that Tribe never wanted to reveal the existence of the sacred site, and only decided to reveal the secret "when faced with the untenable choice of either disclosing the site's identity and risk its desecration by pothunters and profiteers or failing to mention it and risk its loss." IPR cited National Register Bulletin 38 which discusses the reluctance of Native American's to reveal information on sacred sites, "The need to reveal information about something that one's cultural system demands be kept secret can present agonizing problems for traditional groups and individuals." Newport News stated their belief that only the Pamunkey Tribe should be responsible for the sacred site. However, IPR indicated that all six of the original tribes of the Powhatan Nation have an equal responsibility for the site.

Newport News also questioned why there is no corroboration from other Virginia Tribes about the site. The Mattaponi Tribe believes that this is not a legitimate basis for questioning their oral history. Other tribal communities may have their own reasons for declining to disclose information about the site. Newport News suggested that the sacred site could simply be relocated. However, the Mattaponi Tribe contends that moving the site ".....is wholly inconsistent with the Tribe's spiritual practices and traditional beliefs, would destroy the spiritual integrity of the site, and would undercut the cultural identity of the tribe itself."

In their report, the City of Newport News attempted to discredit the Mattaponi tribal historian, Dr. Linwood Custalow by making statements about his motives, indicating that he had already released details about the sacred site in public forums, and suggesting that his information regarding the sacred site had been obtained from a published document. The Mattaponi Tribe objected to these attacks on Dr. Custalow's integrity and provided a summary of his qualifications and service to the community. It should be noted that the statements from public meetings attributed to Dr. Custalow by the City of Newport News do not contain details of the sacred site. Furthermore, the District has not been provided with any documentation to support the City's allegation that any such public release of details on the sacred site by Dr. Custalow has actually occurred. The Mattaponi Tribe suggested that the similarity between Dr. Custalow's accounting and published information is corroboration of oral history rather than plagiarism of modern documentation. As stated above, neither the District staff, ACHP or VDHR found any reason to reject the Mattaponi Tribe's oral history concerning the sacred site.

(a) Newport News Request for Continuation of Section 106 Review: In addition to the reports, Newport News wrote several letters to the District expressing their opinion that suspension of the

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MOA process and TCP mitigation discussions was contrary to the Corps' Section 106 regulations. In October 1999 the District met with Newport News and their representatives to discuss this issue. At the meeting, and in subsequent letters dated 15 October 1999 and 17 November 1999, I informed Newport News that because of my preliminary position of denial, suspension of the Section 106 process was the correct action in this case, and that concurrence had been received from both VDHR and ACHP that the District was acting properly.

(b) Additional Newport News Comments on TCP Report: Although Newport News appeared willing to accept the TCP report after the District investigated the alleged bias issue, they later asked the District to disregard it. In a letter dated 31 May 2000, the City of Newport News claimed that it would be a serious error for me to form an opinion on the effects of the project on TCPs based on the Final TCP report. The City claimed that their consultant, Dr. Thomas King, is more qualified to evaluate the effects of the project on TCPs than the District staff. The City provided Dr. King's critique, which alleged that the TCP report is seriously flawed as evidenced by the authors' failure to follow the Scope of Work, failure to follow applicable procedures and criteria established by law and specified in the scope of work, and their inability to keep their individual biases out of the document. It should be noted that both the City of Newport News and Dr. King reviewed the Draft TCP report in January of 1999, and along with other parties, were given an opportunity to comment. The only issue the City raise at that time was the alleged bias of the authors. Dr. King's criticisms on the procedures would best have been raised during the joint development of the Scope of Work or while the report was in draft form.

In a letter dated 21 November 2000, Dr. King submitted a second letter to the District on behalf of the City of Newport News commenting on Mr. Thompson's review of his critique of the TCP Report and on the District's 6 April 1999 document entitled, "Traditional Cultural Properties: Determination of Eligibility and Evaluation of Effects of the King William Reservoir." In a summary of his opinions, Dr. King advised me that, "In a nutshell, the documents suggest to me that you have been rather poorly advised about both Section 106 and the conduct of 'traditional cultural properties' studies."

Dr. King stated his belief that the authors of the TCP report exceeded their Scope of Work since "they were not directed to make an independent analysis of impacts that the District could use in lieu of making its own analysis." I have conducted my own review of the numerous environmental impacts of the project, and the Tribe's opinions on the adverse effects to TCPs were considered along with all other impacts of the project. Since I considered, but did not use the authors' analysis of impacts in lieu of the District's review, I disagree with the implication in Dr. King's statement. Although he did agree with some of Mr. Thompson's comments, Dr. King stated that there was not enough support for some of his conclusions. Dr. King again questioned Mr. Thompson's qualifications, this time based upon some informal remarks in an e-mail message to the District's project manager. There appears to be a difference of professional opinion between Dr. King and Mr. Thompson with regard to many issues of the TCP report, most notably, whether or not the authors were biased. As indicated above, the District had fully addressed the issue of bias and was not convinced by Dr. King's arguments to reevaluate the issue.

In his critique of the District's 6 April 1999 document addressing eligibility and effects on TCPs, Dr. King disputed the criteria used for some of the TCPs, but did note that all consulting parties had agreed to treat all these properties as eligible for the National Register. Dr. King agreed that the listing of perceived adverse effects "generally tracks the discussion at the 1 April 1999 meeting"; however, he claims that the District's project manager who chaired the meeting had used words such as "nebulous", "minimal", and "remote" to characterize some of the listed effects. While the District does not have a verbatim record of

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the meeting and cannot confirm or deny that these words were used, the exact context in which they were used would be necessary for a true interpretation of their meaning. Finally, Dr. King criticized the District for not distributing the 6 April 1999 document after consultation was suspended.

Norfolk District's archaeologist, Mr. Tim Thompson, was tasked to review Dr. King's comments and to determine if any of the allegations were valid. In a 6 December 2000 memo entitled "Further Review of King William Reservoir TCP Report", Mr. Thompson concluded that the TCP report had been prepared in accordance with both the Scope of Work and with applicable procedures and guidelines. He stated that the TCP report outlined how the tribes believe the TCPs might be affected and contains sufficient information for the District to determine eligibility for the National Register. As even Dr. King admits, there has been no objection to either the identification of the TCPs or their potential eligibility for the National Register. As the bias issue had been addressed in depth by the District, it was not discussed any further.

I have determined that the TCP report accomplishes the primary purpose of the TCP study, which was to identify TCPs. I have reviewed all of the recent information provided by the City of Newport News and nothing contained in it has persuaded me to change my position regarding the impartiality of the TCP authors or the project's adverse impacts to cultural resources.

(12) Impacts to Cultural Resources: It is undisputed that the project would have an adverse effect on historic resources. My June 1999 preliminary position of denial was based in part on impacts to these resources, including TCPs. As proposed, the project would cause flooding or excavation of 115 archaeological sites, 79 of which VDHR recommended for further evaluation. The vast majority of the sites (66) are Native American base camps or temporary camps. There are also an unknown number of sites which may be impacted by pipeline routes, wetland mitigation sites, and construction staging areas which have not yet undergone archaeological investigations. The Phase I report states, "The Cohoke Creek valley native American site resources base is excellent. There will probably be a fairly large number of significant sites affected by the project." The Pamunkey and Mattaponi Tribes have indicated that the archaeological sites are of great importance to their culture, and the Mattaponi have stated that these sites are also of religious importance. In addition, the Mattaponi Tribe has stated in a letter of July 25, 1997, "Flooding the area, even if those remains that have been identified are excavated, would result in an unacceptable loss to the Tribe. Perhaps most important, the Tribe considers any burial grounds to be sacred resting sites, not to be disturbed." The sacred site revealed by the Mattaponi Tribe also has the potential to be of significance to the sciences of archaeology and anthropology. The Tribes have indicated that no mitigation measures would be adequate to compensate for the loss to their culture. In addition to the archaeological sites, there are potentially eligible historic structures and a potential rural historic landscape that must be evaluated for effects, including viewshed analysis.

It should also be noted that in the course of developing the MOA, the presumed course of action for all archaeological sites within the KWR-IV reservoir was data recovery, due to the applicant's inability to further redesign the flood pool or preserve the sites in place. In May of 1999, the ACHP published a notice of guidance in the Federal Register as an attachment to the revised "Protection of Historic Properties" regulations. One part of the guidance entitled, "Resolving Adverse Effects Through Recovery of Significant Information From Archaeological Sites", recommends considering and addressing several issues when recovery of significant information is the recommended course of action. Several of the issues listed are pertinent to this project, including the following: (1) the archaeological site should not be likely to contain human remains or associated funerary objects, sacred objects or items of cultural

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patrimony; (2) the archaeological site should not have long-term preservation value, such as traditional cultural and religious importance to an Indian Tribe; and (3) the Federal Agency Official should determine that there are no unresolved issues concerning the recovery of significant information with any Indian tribe that may attach religious and cultural significance to the affected property. These issues would indicate that data recovery may not be appropriate in this case, and that if the Section 106 process is resumed, further discussions with the Tribes would be necessary before data recovery plans are developed pursuant to the draft MOA.

Traditional practices and beliefs and cultural identity were difficult subjects for the Tribes to discuss with outsiders; however, because of their decision to cooperate, the District was able to fully consider cultural and social issues, identify impacts and discuss potential mitigation measures with direct input from the affected community. The final "Powhatan's Legacy" report identified five Traditional Cultural Properties: the Pamunkey River and its wetlands; the Mattaponi River and its wetlands; the Pamunkey Reservation including the Pamunkey hatchery; the Mattaponi Reservation including the Mattaponi hatchery; and all potentially National Register-eligible archaeological sites within the project area associated with the Powhatan peoples. The report indicates that the reservoir would harm the Native American Tribes and their culture through both direct and indirect effects. The Tribes state that the reservoir would destroy their way of life through the loss of hunting, gathering and fishing habitat, by changing the rural setting from increased residential growth around their reservations, and by severing ties to their ancestors and to a sacred site within the Cohoke valley when the archaeological sites are excavated or flooded. Mitigation for TCP impacts was explored, but not finalized. Further, there are no standard practices for mitigation of this kind. However, I have concluded that the Tribes cannot be fully compensated for the losses to their spiritual connections, culture and traditional socioeconomic practices that they would experience as a result of the construction of the reservoir and the withdrawal of water from the Mattaponi River. (For a detailed discussion of historic resources issues, see the District's report entitled "Historic Resources and Traditional Cultural Properties Consultation for the King William Reservoir Project." Also, the District's chronology of Section 106 coordination appears as "Chronology of Section 106 Coordination and Environmental Justice Issues for the Regional Raw Water Study Group Permit Application.")

n. Air Quality: Residences along State Route 626 and recreational uses in Cohoke Millpond could be adversely impacted by hydrocarbon emissions from the internal combustion engines of construction vehicles and increased dust emissions from land disturbances and construction activities at the reservoir. There are no residences in the immediate vicinity of the proposed intake. However, subsistence fishing and gathering by the Mattaponi Tribe as well as recreational uses of the Mattaponi River by the general public could be adversely impacted by construction activities. Increased dust emissions could also have an adverse effect on fish and wildlife resources in both construction areas.

Had the project been authorized, it would have been analyzed for conformity applicability pursuant to regulations implementing Section 176(c) of the Clean Air Act. It is anticipated that the activities proposed under this permit application would not exceed de minimis levels of direct emissions of a criteria pollutant or its precursors and are exempted by 40 CFR Part 93.153. Any later indirect emissions would generally not be within the Corps' continuing program responsibility and generally could not be practicably controlled by the Corps. For these reasons a conformity determination would likely not be required.

o. Health and Safety: The increased vehicular traffic on rural roads in the area from the transportation of workers and materials to the construction sites during the anticipated three-year

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construction period could lead to increased traffic incidents. The existing Cohoke Creek crossing of County Route 626 would be inundated by the reservoir pool, but would be relocated to the top of the dam structure. Emergency access for police and fire vehicles would be temporarily re-routed during construction. Short-term increases in noise levels are expected during construction and long-term increases in ambient noise levels would occur during the operation of pumps at the pump stations on the Mattaponi River and at the reservoir.

The Corps of Engineers Institute for Water Resources' analysis of the need for additional water indicates that unless the region suffers a drought more severe than any recorded in the twentieth century, the RRWSG would have minimal risk of shortage through about 2030. The risk of shortage requires implementation of drought curtailment measures (water use reductions) and does not translate into a risk to human health and safety.

p. Recreation:

(1) Mattaponi River: The Mattaponi River and its banks are used year-round for recreational fishing, boating and hunting. Although there are several public boat ramps on the river, none are located in the immediate vicinity of Scotland Landing. The Mattaponi River and its freshwater tidal wetlands support a number of fish and birds important to local sportsmen and there are several privately owned duck blinds and hunt clubs near Scotland Landing. King William County plans to develop a recreational park on the remainder of the 188-acre parcel purchased by the City of Newport News for the construction of the intake and pump station. The Mattaponi Tribe has expressed concern that additional recreational boating would disrupt their subsistence fishing and other traditional uses of the river. Mattaponi Tribal fishermen report that pleasure boaters often negatively impacts their catch by ripping their drift nets. During discussions on potential mitigation for the adverse effects to Traditional Cultural Properties, the City of Newport News offered to ensure that the County would not include a boat ramp at the proposed recreation area. River water depths would not be measurably impact by the proposed withdrawals since the intake would be located in tidal waters. The intake structures should not restrict recreational uses of the river, however the intake area would be marked by warning buoys.

(2) King William Reservoir: King William County plans to develop up to 5 recreational sites on and adjacent to the reservoir for swimming, fishing and boating. In order to protect water quality, only electric outboard motors would be allowed. The plan includes the construction of fishing piers, boat launching facilities and floating boat docks to provide public access for year-round recreational fishing. The VDGIF recommended that King William County consult with them regarding the location of boat ramps within the reservoir. Also, camp sites, picnic areas and nature trails would be established. The reservoir would provide a 1,526-acre lake which would be stocked with forage and game species for freshwater fishing. Hunting would also be allowed in the vicinity of the reservoir with certain restrictions.

In the 1990 King William Reservoir Project Development Agreement, the City of Newport News promised King William County that for at least 90% of the time, water surface elevations within the reservoir would remain within 6 feet of the spillway elevation to ensure continued recreational benefits. However, because the District required that the proposed 47% dead storage included for recreational purposes be reduced, the applicant revised the Agreement to reflect 25% dead storage. This storage would provide water surface elevations within 15 feet of the spillway elevation for at least 90% of the time and within 2 feet of the spillway for at least 60% of the time. Then in a second addendum to the

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Agreement, the City of Newport News pledged to further protect the recreational benefits of the smaller surface area with KWR-IV by guaranteeing that the water surface elevation would remain within 15 feet of the spillway elevation at least 94% of the time and within 2 feet of the spillway elevation at least 69% of the time. It is not clear how this can be guaranteed under the modified 80% Exceedence MIF which is a condition of the DEQ permit. There would undoubtedly be times when even the less restrictive modified 40/20 Tennant MIF proposed by the applicant would not allow withdrawal from the Mattaponi River to maintain these levels.

(3) Cohoke Creek: Several bird and mammal species are hunted in the Cohoke Creek valley and there are a number of hunt clubs and duck blinds that could be impacted within the basin. The land available for hunting in the area would be significantly reduced. The majority of recreational fishing in Cohoke Creek takes place downstream of the proposed reservoir in the privately owned 85-acre Cohoke Millpond where the Cohoke Club has a small boathouse and a private fishing dock. Fish species in the Millpond could be impacted by siltation during reservoir construction and by long-term changes in water quality and quantity as a result of reduced flows.

(4) Diascund Reservoir: In their May 1999 Fish and Wildlife Mitigation Plan, the RRWSG mentioned for the first time the proposed development of a public recreational facility at Diascund Reservoir as a recreational benefit of the King William Reservoir project. They state: "New Kent County, through which part of the pipeline will run, will benefit from the development of a new public recreational facility at the existing Diascund Creek Reservoir." This has not been proposed to the District; therefore, the impacts have not been evaluated. Depending on the nature of the facility, a permit from the Corps of Engineers may be required.

q. Socioeconomics:

(1) Mattaponi and Pamunkey Indian Tribes: The Mattaponi and Pamunkey People have lived by hunting, trapping, fishing and gathering on the Mattaponi and Pamunkey Rivers and in the area known as Pamunkey Neck for thousands of years and still depend to a great extent on the natural ecosystem that surrounds their reservations. Many current residents of the reservations make their living from the Mattaponi and Pamunkey Rivers and the surrounding land and rely on the year-round gathering of fish and other animals and plants for their subsistence. Both tribes operate shad hatcheries to restore the shad stock in the York River basin. Tribal members consider shad fishing an important traditional community-centered activity and an integral part of their identity.

A substantial portion of the Mattaponi Tribe's food supply comes from fishing, mostly during the shad and herring runs in the spring. Tribal members also depend on other fish such as striped bass, catfish, perch and carp as well as game such as deer, wild turkey, ducks, geese, squirrels, rabbits, turtles and beaver. The use of wild plants is an important part of the lives of many tribal members. Approximately sixty wild plants found on the reservation or the surrounding land are still gathered by the Mattaponi People for food, medicine, and ceremonial and ritual uses. Plants used for medicinal purposes include myrtle leaves, flag root and foxglove. Plants gathered for food include tuckahoe tubers, local wild cactus, wild rice and yucca. The Mattaponi Tribe believe that the Mattaponi River and the ecosystem surrounding the reservation is critical to their continued existence as a tribe.

The Mattaponi Tribe fears that the potential increased salinity levels from the proposed pumping of up to 75 mgd of freshwater from the Mattaponi River could result in significant adverse impacts to American

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shad and related fish species and irreversibly alter the natural habitat of freshwater plants and animals on which the Tribe depends. Also, they fear that the withdrawal would increase water temperatures and reduce oxygen levels in the summer resulting in adverse effects to shad and herring nursery areas. As the intake would be located within the prime spawning area for shad and other anadromous fish, the Tribe fears that the intake would harm fish eggs and juveniles, remove the fishes' food supply and concentrate predatory fish. They fear that changes to hydrologic patterns and tidal dynamics would adversely affect shad habitat, disrupt spawning behavior and affect the viability of eggs and the survivability of larvae and juveniles; all of which could eventually destroy the already depleted shad supply. Disruption of their shad fishery and hatchery operation would represent a major cultural loss and a potential economic loss to the Mattaponi Tribe.

The Mattaponi Tribe also fears that the construction of such a massive project so close to their reservation as well as increased property development brought to this rural area by the reservoir would disrupt their hunting and gathering practices and irrevocably alter their way of life, their culture and ultimately, their existence as a tribe. According to the 1997 King William County Comprehensive Plan, moderate residential development would be allowed within the watershed protection area around the reservoir; and moderate mixed residential, light commercial and planned unit development would be allowed along the periphery of the watershed protection area. Such development would change the rural and agricultural setting of the area and decrease the habitat available for hunting and gathering. The Mattaponi Tribe views the reservoir and the subsequent development around the reservoir as further trespass on their historic lands. According to the Mattaponi Tribe, many of their people who live off the reservation would like to return to their traditional homeland to continue the Tribe's culture and traditional way of life. As a part of their "Legacy Plan", the Mattaponi Tribe is trying to acquire additional land for expansion of the reservation to allow more tribal members an opportunity to move to the reservation. Residential and commercial development such as that described in the King William Comprehensive Plan may compete with the Tribe for those lands and may drive real estate prices in the area out of the reach of Tribal resources. The development potential of the land surrounding the reservoir would be expected to increase its value, especially the lakefront property. The Mattaponi Tribe fears that these impacts would eventually mean the demise of the Mattaponi Tribe.

(2) Commercial Fisheries: The taking of shad in the Mattaponi River is prohibited to the general public due to depleted stocks. Creel limits for shad are zero in other rivers as well, including the upper portions of the Pamunkey River, Rappahannock River, James River, Meherrin River, Chickahominy River and the Appomattox River. However, shad are commercially fished in the Chesapeake Bay, and any adverse effects to spawning in the rivers would affect the economy of those depending on the commercial catch of shad in the Bay.

(3) Development Potential: The population of King William County increased only slightly in recent years and the County remains primarily rural. The RRWSG stated in the FEIS that there would be minimal development around the reservoir. However, King William County intends to allow moderate residential development within the watershed protection area around the reservoir; and moderate mixed residential, light commercial and planned unit development along the periphery of the watershed protection area. The recreational potential offered by the open water of a man-made lake would undoubtedly lead to an increase in the development of retirement, weekend and summer homes. Since the County's recent population growth is related to the growth of the City of Richmond, there is the likely potential for the development of bedroom communities in the area as well. Central water and sewage services are not available and the County does not currently plan to develop a central water system to take

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advantage of the 3 mgd source of raw water available to them as hosts for the reservoir. The County has stated that it is more likely that the water resource would be used to attract industry to the county rather than to replace residential wells; therefore, any new residential development would be dependent on wells. The value of the land surrounding the reservoir may increase following the construction of the reservoir, especially the immediately adjacent waterfront lots. The RRWSG will acquire the land on which the reservoir would be built and transfer it to King William County. No existing houses would be displaced by construction of the reservoir; however, if landowners do not wish to sell, the RRWSG may acquire the land through eminent domain. As King William County will own the land, the County would benefit financially from lease and tax payment from the City of Newport News. Also, the County would receive financial gain from the added recreational opportunities provided by the lake. Business activity in the area is expected to temporarily increase during construction.

A “no discharge zone” would be required for five miles both upstream and downstream of the intake pipeline at Scotland Landing which could result in restrictions to property owners for future development on both sides of the river. The imposition of such land use restrictions could result in the diminution of property rights and property values for landowners on this stretch of the river.

(4) Agricultural Irrigation: There are minor withdrawals of freshwater from the Mattaponi River for agricultural irrigation. Farmers who use Mattaponi River water fear that the impact of the proposed withdrawals in addition to natural salinity changes would increase the frequency of salinity intrusion and destroy their crops if they continue to use the water for irrigation. In the FEIS, the RRWSG investigated the most downstream irrigator, Enfield Farm in King William County. The farm is situated on the oligohaline range of the river where the average salinity is 0.0 to 0.5 ppt and current crops are corn, soybeans and turf grass. The RRWSG reported that the threshold level at which some crops (e.g. corn) begin to experience negative impacts from increased salinity is 0.45 to 0.5 ppt. The RRWSG’s analysis of salinity data shows that the post-withdrawal salinity level would still be below the tolerance threshold levels. Also, the RRWSG’s analysis indicated that the crops grown by these farmers would be tolerant of the small predicted salinity increases brought about by the withdrawal and concluded that there would be no adverse impacts on irrigation as a result of withdrawals. The RRWSG’s analysis is based on the results of the VIMS salinity study which did not consider the cumulative effects of other consumptive uses or the additive effect of the proposed withdrawals with natural, pre-existing salinity fluctuations. The RRWSG’s analysis also did not appear to consider the effects on less salinity tolerant crops or future increases in agricultural irrigation in the Mattaponi watershed.

(5) Increased Cost to Newport News Waterworks Customers: Newport News Waterworks customers have expressed concern that the costs associated with building the reservoir will cause their water rates to increase. The City of Newport News has acknowledged that water rates will increase by 31% by the year 2006 (64 cents per 100 cubic feet of water- \$85.56 more per 100,000 gallons than current charges) in order to pay for the King William Reservoir and other water supply projects. Half of the rate increase (\$150 million dollars or \$43.00 per 100,000 gallons) is attributed to the King William Reservoir. To date, an estimated \$16 million has been spent on the planning of the reservoir. Several months after my preliminary position of denial was announced, the Newport News City Council approved spending an additional \$680,000 for legal and engineering fees associated with continued pursuit of the permit. The most recently reported estimate for the total cost of the King William Reservoir was \$167.5 million dollars.

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r. Energy Needs: Fossil fuels would be consumed during the construction of the reservoir, and electric power would be used to run two pump stations. No adverse impacts are anticipated.

s. Land Use Classification and Coastal Zone Management Plans: The project must be constructed and operated in a manner that is consistent with the Virginia Coastal Resource Management Program. The City of Newport News has written to the Virginia Coastal Program Manager stating that the project is consistent with the Act; however, the state has requested more information in order to determine if they concur with the applicant's draft federal consistency certification.

(1) Mattaponi River: According to the 1997 Comprehensive Plan for King William County, the intake site would be located within a designated Resource Protection Area; therefore, its development must comply with the Chesapeake Bay Preservation Act. Due to the remoteness of the Mattaponi River intake site from existing development, limited impacts on existing land uses are anticipated. However, a "no discharge zone" would be required for five miles both upstream and downstream of the intake pipeline at Scotland Landing which could result in restrictions to property owners for future development on both sides of the river. An access road and 2.5 miles of new electrical transmission line to the pump station would require additional clearing and right-of-way maintenance. King William County has announced plans to develop the remainder of the 188-acre property purchased for the 3-acre intake site as a recreational park.

(2) King William Reservoir: The King William Reservoir would be constructed in King William County, a rural area with little or no commercial or industrial development. The project area is generally undisturbed except for silvicultural activity. The majority of the reservoir watershed is currently forested land and the remainder consists of wetlands, open water and roads. About 65% of the watershed is currently managed for silvicultural activities. No existing houses would be displaced by the proposed reservoir. According to the 1997 King William County Comprehensive Plan, the area immediately adjacent to the reservoir would be designated as a Resource Protection Area in accordance with the Chesapeake Bay Preservation Act. This would be a 100-foot wide buffer zone around the reservoir in which no buildings, land disturbance activities or clearing would be allowed. The remainder of the watershed is designated as a Watershed Protection Area which is also in the County's Resource Management Area. The RRWSG stated in the FEIS that there would be minimal planned development around the reservoir; however, the 1997 King William County Comprehensive Plan indicates "Moderate residential development is intended within the Watershed Protection Area and at its periphery a narrow area is designated for moderate mixed development of residential, light commercial and planned unit development." Human disturbances from such development would change the rural and agricultural setting of the area.

(3) Pipeline Routes: The pipeline would traverse forested and agricultural lands. Agricultural lands would be removed from their current use and forested areas would be cleared. The forested areas would not be allowed to re-grow as forests but only as herbaceous or scrub-shrub cover types so that the utility corridor could be maintained.

t. Environmental Justice:

(1) Executive Order 12898: Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (59 Fed. Reg. 7629), requires federal agencies to consider disproportionately high and adverse environmental effects on minority and low-

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income populations and to give minority and low-income populations access to information and opportunities to provide input to decision-making on federal actions. Therefore, the District and EPA consulted concerning federal actions to achieve Environmental Justice when considering impacts to the American Indian and African-American minority populations in the area. As a part of their mission, federal agencies must identify and address any disproportionately high and adverse human health or environmental effects of their activities, programs, or policies on minority and low-income populations.

Although an environmental justice analysis is not mandated by NEPA, the Department of Defense has directed that NEPA be used as the primary approach to implement the provisions of Executive Order 12898. In a memorandum accompanying the February 11, 1994 Executive Order, President Clinton specified that federal agencies shall analyze the environmental effects, including human health, economic and social effects, of federal actions, including effects on minority communities and low-income communities, as well as mitigation of those effects, when such analysis is required by NEPA. The memo further directs federal agencies to improve the accessibility of meetings, crucial documents, and notices, and to use Title VI of the Civil Rights Act of 1964 to ensure that all programs or activities that receive federal financial assistance that affect human health or the environment do not unjustly discriminate.

The applicant and the District previously attempted to undertake an environmental justice analysis for the King William Reservoir project in the Supplement to the Draft EIS (December 1995) and Final EIS (January 1997). Those efforts came at a time when environmental justice analysis was a relatively new concept to federal agencies, including the District and EPA. At that time there was little guidance available to agencies as to how to properly analyze environmental justice issues. Although the available information has not changed substantially, our current understanding of the process has. Therefore, the District determined that the environmental justice analysis for this project should be updated and refined to more fully and accurately reflect current expectations for such analyses in the federal review process. The District is including an updated analysis in this document.

(2) Minority Populations Potentially Affected by the Proposed Project:

African Americans: A small African-American community is located near State Route 626 in the vicinity of the proposed dam. The applicant's plans for the reservoir would not result in the displacement of any of the homes in this community. The District held a public meeting at Aquinton Elementary School, in King William, Virginia, in 1994. No one attending this meeting identified themselves as members of this community or spoke out against the project. The City of Newport News also held a meeting in October 1997 with property owners and residents of this area. The District did not receive any public comments identifying such comments as coming from this minority group either in support of or in opposition to the project. Construction of the reservoir would result in increased vehicle traffic, increased noise and increased dust emissions from land disturbance that would affect the minority community. However, as these impacts would also be felt by non-minority individuals in the area, these effects would not be considered as disproportionately high and adverse impacts to this minority population.

Native Americans: Three Native American tribes would potentially be affected by the proposed King William Reservoir: The Mattaponi, Pamunkey and Upper Mattaponi Tribes. The members of these Tribes are descendents of the Powhatan people who occupied the land when the first European settlers arrived in the 17th Century. The Tribes were notified through public notices and other letters about the King William Reservoir proposal almost from the beginning of the project (approximately 1994) when it was one of 31 alternatives considered in the Draft EIS. The Norfolk District Corps of Engineers has been

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working closely with the Pamunkey, the Upper Mattaponi and the Mattaponi Indian Tribes since approximately February 1997 to identify the reservoir permitting issues that have the potential to affect the Tribes.

The proposed reservoir would not be built on Tribal lands, but would be located between Virginia's only two American Indian Reservations: the 150-acre Mattaponi Reservation on the Mattaponi River with 65 residents and the 1,200-acre Pamunkey Reservation on the Pamunkey River with 75 residents. The Upper Mattaponi Tribe owns community land, but does not have a reservation. The Mattaponi and Pamunkey Reservations are two of the oldest Indian reservations in the United States. Also, the water needed to fill the reservoir would be withdrawn from the Mattaponi River, at a location upstream of the Mattaponi Reservation.

The Tribes believe that the proposed reservoir and Mattaponi River water withdrawal would affect them environmentally, culturally and economically. The Tribes claim that the reservoir would destroy their way of life through the loss of hunting, gathering and fishing habitat, by changing the rural setting through increased residential growth around their reservations, and by severing ties to their ancestors within the Cohoke Valley when archaeological sites are excavated and/or flooded. The Mattaponi people also believe that their subsistence shad fishery and hatchery operation would be lost or irreparably harmed by changes in salinity and impacts to shad eggs and juveniles associated with the raw water intake on the Mattaponi River. The Mattaponi Tribe claims that the land and River are their heritage and are critical to their culture and their continued existence as a tribe. The Mattaponi Tribe describes their heritage as a spiritual and historic connection to the Mattaponi River and the Cohoke Valley.

(3) Federal Trust Responsibility: None of the three Tribes is yet federally recognized, and until recently all were seeking that status. In January 2001, the Mattaponi and Pamunkey Tribes withdrew from the effort of all eight Virginia tribes to obtain federal recognition. Although the federal trust responsibility to Native American tribes applies only to federally recognized tribes, the Norfolk District has chosen to treat the Tribes as though they were federally recognized to the extent possible and appropriate. On 25 February 1998, former District Commander, Colonel Robert H. Reardon, Jr. signed a Memorandum for the Record memorializing his 7 March 1997 decision to treat the Mattaponi and Pamunkey Tribes "as if they were federally recognized tribes, to the extent I am permitted to do so by applicable statutes and regulations." Accordingly, the Norfolk District has made every effort to keep the Tribes informed during the processing of this permit application and to involve them where their input was appropriate. The Treaty of 1677, which was made with King Charles II of England, is held by the Commonwealth of Virginia, not by the federal government; therefore, any Corps permit decision could not violate the treaty.

(4) Demographic Characteristics of the Closest Census Tract: Typically, an environmental justice analysis requires that the federal agency collect population data, using census data to describe the race and income characteristics of the residents within the census subdivisions in and around the area of the proposed action. To determine proportionality of effects, each census tract or block numbering area (BNA) is usually compared to the statistics of a large community as a whole. This larger community is called the "community of comparison" (COC). It is identified as the smallest political unit(s) that encompasses the entire impact footprint, and could be a county, a municipality, a collection of such entities, or even the entire state in appropriate circumstances. Comparing the statistics of each tract or BNA with those of the COC will indicate which tracts have a higher proportion of minority or low-income populations. The tracts with the higher proportion of these populations and that are touched by

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the adverse impact footprint are presumed to suffer disproportionate impacts, even if the COC exhibits a higher minority or low-income population percentage than the affected tract. If the census tract percent is equal to or less than the COC percent, a federal agency can generally presume no disproportionate effect on minority or low-income populations.

King William County, being a rural area, is comprised of BNA's 9501, 9502 and 9503, together identified as Geocode 51101. Block Numbering Area data for King William County reveals the following: The total minority population of King William County as determined by the 1990 census was 3,542, representing 32.4% of the population. Most of this minority population was African-American. Sixteen Hispanic residents accounted for 0.1% of this demographic. The Native American/Eskimo/Aleut population of King William County was 218 individuals, or 2.0% of the county's total population. Persons below the poverty level numbered 1,002 or 9.3% of the total county population. The census data available to the Norfolk District does not correlate these two statistics, so it is not possible to determine how many of the minority households might also fall into the "below the poverty level" category. (Not all 2000 census data were available at the time of this analysis; therefore the complete 1990 census data were used.)

In certain situations it is appropriate for an environmental justice analysis to consider effects in a somewhat different manner than by comparing BNAs or census tracts to COCs as described above. This is because concentrations of isolated minority or low-income populations within the impact footprint could be missed despite their being unfairly impacted by the project in a way the larger population is not. This was the case in King William County, where the total environmental justice population (i.e., the three Native American Tribes) was a mere 2% of the entire county population. EPA's Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analysis notes that:

"A factor that should be considered in assessing the presence of a minority community is that a minority group comprising a relatively small percentage of the total population surrounding the project may experience a disproportionately high and adverse effect. This can result due to the group's use of, or dependence on, potentially affected natural resources . . . The data may show that a distinct minority population may be below the thresholds defined in the IWG key terms guidance on minority population. However, as a result of particular cultural practices, that population may experience disproportionately high and adverse effects. For example, the construction of a new treatment plant that will discharge to a river or stream used by subsistence anglers may affect that portion of the total population. Also, potential effects to on- or off-reservation tribal resources (e.g., treaty-protected resources, cultural resources and/or sacred sites) may disproportionately affect the local Native American community and implicate the federal trust responsibility to tribes."

Such is the case with the effects that would occur from the construction of the proposed King William Reservoir. It is important to note that this environmental justice analysis deals with something other than the more typical discussion of whether a low-income or minority population would be disproportionately and adversely impacted by effects such as pollution or noise. Many of the impacts to the minority populations discussed herein result from impacts to their cultural resources, as well as to natural resources they use in a manner that differs from the general population of the area.

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(5) Potential Adverse Environmental Effects to the Tribes: The City of Newport News claims that a substantially larger number of minority (African Americans) and low-income individuals on the lower peninsula would benefit from the affordable and reliable future water supply and the growth it would spawn than the number of minorities (American Indians) that would be harmed by the project. Therefore, they reason that there would not be a disproportionately high adverse effect to a minority population. Instead, they claim that the economy and cultural values of the much larger minority and low-income community on the Peninsula would be affected if water from the proposed King William Reservoir is not made available to them. This interpretation is clearly not the intent of the President's Environmental Justice directive. When determining whether environmental effects are disproportionately high and adverse, federal agencies are to consider the following:

- whether there is or would be an impact on the natural or physical environment that significantly (as defined by NEPA) and adversely affects a minority population, low-income population, or Indian tribe. Such effects may include ecological, cultural, human health, economic, or social impacts on minority communities, low-income communities, or Indian tribes when those impacts are interrelated to impacts on the natural or physical environment; and
- whether environmental effects are significant (as defined by NEPA) and are or may be having an adverse impact on minority populations, low-income populations, or Indian tribes that appreciably exceeds or is likely to appreciably exceed those on the general population or other appropriate comparison group; and
- whether the environmental effects occur or would occur in a minority population, low-income population, or Indian tribe affected by cumulative or multiple adverse exposures from environmental hazards.

The District has identified the following potential adverse environmental effects to the Tribes associated with this project. These impacts include, but are not necessarily limited to the following and are not listed in order of importance.

(a) Impacts to Cultural Resources: The Mattaponi Tribe considers any effort to locate, excavate, construct or flood archaeological/historical sites as disturbing to them and their deceased ancestors. Proper reverence and concern for the Tribe's culture is of critical importance to them. Flooding of the area, even if the sites have been excavated, would represent an unacceptable cultural and religious loss to the tribes. Although the initial archaeological survey did not locate any burials, all three Tribes are very concerned about the possibility that human remains would be discovered within the impact footprint during the more extensive Phase II archaeological survey. Although the Pamunkey Tribe are willing to have skeletal remains relocated, any disturbance or removal is unacceptable to the Mattaponi Tribe, who requested that the remains be left undisturbed by reconfiguring the project design. Also, the Mattaponi Tribe has asserted that a specific sacred site of great historical significance exists somewhere within the area to be impacted by the proposed reservoir. Because of the great traditional and religious significance of this site, and their cultural reticence to discuss issues of this nature with outsiders, the Tribe chose not to mention this site or bring it to the District's attention until May 1999. Disrupting or flooding the sacred site, any potential burial sites, and the approximately 115 archaeological sites within the impact footprint would be perceived as a significant spiritual loss to the Mattaponi Tribe. These impacts are unacceptable to the Mattaponi Tribe and such spiritual and cultural losses cannot be compensated. While data recovery would be the presumed course of action when a project area would be flooded, recent guidance from ACHP indicates that data recovery may not be appropriate when: (1) the

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site is likely to contain human remains, funerary remains, sacred objects or items of cultural patrimony, (2) the site has long-term preservation value, such as traditional cultural and religious importance, and (3) there are unresolved issues with any Indian tribe concerning the recovery of significant religious and cultural properties.

(b) Loss of Archaeology: The Tribes are concerned that any excavation of archaeological sites has the potential for loss and/or mishandling of the resources they contain. The loss or mishandling of artifacts that could help demonstrate that the tribes are culturally identifiable entities with continued occupation of the area could adversely affect the Tribes' ability to successfully achieve federal recognition. Additionally, non-Indians would most likely be given the responsibility for interpreting any archaeological resource. The Tribes feel that they would suffer a loss if their own people are not primarily involved in this interpretation. The City of Newport News has offered to have a tribal member present during excavation; however, the tribes remained concerned about possible misinterpretation of their culture and heritage. Only the 72 to 79 sites considered to be "potentially eligible" are included in treatment plans in the MOA; therefore, treatment of the remaining identified sites would be outside of the Section 106 review process. Although the Mayor of the City of Newport News made a commitment to the tribes to investigate the remaining sites within the reservoir footprint, the level of review that these sites would receive is unknown and would not be binding under the proposed MOA.

(c) Effects of Water Withdrawal from the Mattaponi River: The Tribes believe that there would be adverse impacts from the reservoir intake on shad eggs and shad juveniles from entrainment and impingement. Any eggs, juveniles, and fish food sources smaller than one millimeter could be pulled into the intake and lost. The Tribes are also concerned about the potential effects of increased salinity of the Mattaponi River on the spawning behavior of adult shad and other anadromous and non-anadromous fish and on the growth and mortality of shad eggs and juveniles. The Tribes believe that the withdrawal of water and its associated salinity changes could affect when and where fish spawn and affect the availability of food sources. There may also be adverse effects on the Mattaponi's subsistence shad hatchery (and possibly the Pamunkey shad hatchery as well). The Tribes believe that higher salinity levels and other physical and chemical changes associated with the water withdrawal could affect the survival and development of shad fry released into the river by the Tribes at their hatcheries. The released fry would also be subject to entrainment and impingement at the intake.

Despite the limited biological and ecological information available, the City of Newport News has concluded that there would be no adverse impact to any life stages of shad in the York River basin. This conclusion has not been substantiated. Dr. Garman did not concur with the Tribe's claim of significant and detrimental impacts as a direct result of the King William Reservoir project; however, he noted that his review did not consider the potential for indirect ecological effects as a result of physiochemical changes on fish assemblages. He stated that without information on temporal and spatial distribution, spawning and early life history stages, it is very difficult to assess the ecological impact on anadromous fish populations in the Mattaponi River from the proposed project. While the intake design should reduce impacts to anadromous fish eggs and larvae, it would not eliminate them altogether. It is true that despite the best efforts of the state and the Tribes, the shad population may continue to decrease even without the water withdrawal for the reservoir. However, the interaction of numerous chemical and physical effects including the small but sustained increase in salinity that would result from the removal of up to 75 mgd of freshwater from the Mattaponi River has the potential to further degrade the already depleted shad population. The Mattaponi and Pamunkey Tribes have made a considerable commitment to their shad hatcheries, and shad fishing is an integral part of their lives and their culture. As members of the

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Mattaponi Tribe depend on these fish for their livelihood, the further degradation or potential loss of this resource would significantly and adversely affect the culture and economy of these people.

(d) Mattaponi River Cultural Factors: The Mattaponi Tribe considers the Mattaponi River the lifeblood of the Tribe and a gift of life from the Great Spirit. To them it is a very spiritual place and much more than simply a body of water. The Tribe has many religious and spiritual ceremonies closely associated with the river, which they consider “sacred waters.” The Tribe believes that disruption or “defiling” of the river and its flow would create an imbalance in the circle of life and dishonor the Tribe's ancestors and Mother Earth. The spiritual importance of the Mattaponi River to the Tribe was recognized in its identification as a Traditional Cultural Property. This spiritual and religious importance is a vital cultural value which may be difficult for non-native people to understand. Because this cultural value is unique to the Native Americans in the project area, impacts to it would appreciably exceed those to the general population.

(e) Impacts of Increased Recreational Boating on the River: Boating activity disrupts the Tribes' ability to successfully fish both on a daily basis and during the shad runs in the spring. Fishing nets are also damaged by boat propellers. These effects already occur to some extent, but the Tribes fear a substantial increase if the King William Reservoir is built because of the increased residential development that is likely to follow. Recreational boating may also disrupt tribal spiritual and religious ceremonies performed on the river, including baptisms. Increased boating activity is likely to occur with or without the proposed reservoir; however, the planned residential development in the area will most likely lead to an increase in recreational uses of the River. Because fishing for subsistence is vital to the Tribes (and possibly to other low-income populations in the area), further disruption of their ability to obtain fish would appreciably exceed such impacts to the general population.

(f) Socioeconomic Effect on Hunting, Trapping and Gathering: Many members of the Mattaponi Tribe do not have outside jobs, and they depend upon the natural resources in the Pamunkey Neck for subsistence hunting, fishing, trapping and gathering. The Mattaponi Tribe would lose a portion of their subsistence hunting and trapping area if the 1,526 acres of wetlands and uplands in the Cohoke Valley are filled, flooded or otherwise modified by the construction of the proposed reservoir. The County's planned residential and light commercial development around the reservoir would further decrease the land available for hunting, trapping and gathering. While not a part of the current application, the City of Newport News has made plans for a future expansion of the reservoir to the originally proposed dam location, thereby removing additional lands used by the Tribes for obtaining food and materials. The Pamunkey Neck is the primary hunting ground for all three tribes. This area is also used by the Mattaponi Tribe to gather native wild plants for food, medicinal and ceremonial uses. Animals displaced by the reservoir and subsequent development would be forced to relocate to other habitats and would overcrowd those areas, forcing additional competition for food sources which would result in an overall negative impact on the Tribes' source of game. Similar impacts to trapping and gathering habitats both within the Cohoke Valley and along the Mattaponi River would also be expected. The Mattaponi tribe is concerned that chemical changes in the Mattaponi River could adversely affect native plants growing along the river that are important to the Tribes as food and for medicinal and ceremonial uses. Because hunting, trapping and gathering for subsistence is vital to the Tribes (and possibly to other low-income populations in the area), further disruption of their ability to obtain food from these sources would appreciably exceed such impacts to the general population.

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(g) Physical Barrier Between Reservations: The reservoir is proposed to be constructed directly between the Pamunkey and Mattaponi reservations. As County Route 626 would be reconstructed on top of the dam, access between the reservations by road would not be disrupted. However, the Tribes believe they would be further isolated socially and culturally from one another by the physical barrier of a reservoir in this location. Only the Mattaponi and Pamunkey Tribes would be affected by cultural isolation of their reservations from one another; therefore this effect would appreciably exceed such impacts to the general population.

(h) Reservation Expansion/Tribal Land Reclamation Efforts: The Mattaponi and Pamunkey Tribes fear that construction of a reservoir at this location would preclude their ability to expand their reservations. These Tribes have indicated a desire to obtain additional land in order to enlarge their current reservations. The Mattaponi and the Pamunkey Tribes have been attempting to reclaim areas they view as their historic tribal lands and that have special cultural and religious significance to them. Property values may or may not increase without the presence of the reservoir; however, the County's planned residential and light commercial development around the reservoir will likely increase the developmental potential and property value of other lands. Therefore, the cost of additional land purchases is likely to become prohibitive for the Tribes. Only the Mattaponi and Pamunkey Tribes would be affected by the lack of ability to expand their reservations; therefore, this effect would appreciably exceed such impacts to the general population.

(i) Loss of Rural Character of the Local Area: The Tribes fear a loss of privacy will accompany the loss of the rural character of the area. The County has plans for residential and light commercial development around the reservoir, and the recreational potential of the reservoir is likely to further increase development of summer and weekend homes. Such development would change the rural and agricultural setting of the area and further reduce the habitat available for game animals on which the Tribes depend for a source of food. The loss of rural character would impact practices which are important to the subsistence and culture of the Tribes.

(6) Mitigation Measures Available: When environmental justice impacts could occur, the President's Memorandum accompanying E.O. 12898 directs that mitigation measures be identified. All of the Tribes have indicated that, in their opinion, there are no measures that would adequately mitigate for the losses identified in this analysis. Despite this belief, they agreed to discuss possible mitigation measures with the District and the permit applicant during the NHPA Section 106 Memorandum of Agreement discussions. The Mattaponi and Pamunkey Tribes were careful to remind all parties during these discussions that they were participating in this process not because they believed the loss of Traditional Cultural Properties and other adverse environmental effects could be mitigated for, but because they did not want to be left with no mitigation at all if the permit were granted.

Each of the three Tribes and the applicant proposed a number of specific suggestions for appropriate mitigation measures. Types of mitigation discussed during these discussions included cash payments, creation of one or more museums to house and showcase tribal artifacts, and purchase of additional land to expand the size of the two reservations. Dollar amounts and types of proposed mitigation varied widely between the permit applicant and the Tribes. Each Tribe chose to discuss potential mitigation measures separately from the other Tribes and the other consulting parties; therefore, the District, ACHP and VDHR met with each tribe and the applicant in separate meetings. The Tribes also asked that their specific proposals be kept confidential to the maximum extent possible.

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Initially, the District worked with the City of Newport News and the Tribes in an attempt to come to a mutually agreeable resolution of the mitigation issue, or at least identify an acceptable range of mitigation alternatives. Such agreement would have been helpful to me in judging what would be appropriate mitigation for the impacts of the project to environmental justice. Ultimately, however, no agreement was reached between the City and the Tribes as to what measures might be acceptable to both sides. Discussions were discontinued shortly after I announced my preliminary intention to deny the permit in June 1999. The City of Newport News asserted that the District's handling of the matter was both "inconsistent" and "questionable"; and strongly urged me to continue holding meetings in order to come to a conclusion on what would constitute appropriate mitigation. The District discontinued discussions at that time because there was no longer a federal undertaking in the offing. Both the Virginia Department of Historic Resources and the Advisory Council on Historic Preservation agreed that this was the proper course of action. Furthermore, the Tribes indicated they did not intend to return to these mitigation discussions unless it became clear that the permit for the reservoir would be granted. Without the active participation of the Tribes, I believed that such meetings would not be helpful to the District's decision-making process on the question of environmental justice-related mitigation measures. Furthermore, at the last meeting held with each tribe as well as in subsequent letters, the City of Newport News had indicated that they had made their "...best and final financial proposal."

(7) Summary of Findings on Environmental Justice: The Norfolk District, has determined that the Mattaponi, Upper Mattaponi, and Pamunkey Tribes would suffer the following disproportionately high and adverse environmental effects as described by Executive Order 12898 if the permit for the King William Reservoir were granted:

- Construction of the proposed King William Reservoir project would have a combined impact on the natural and physical environment that has the potential to significantly and adversely affect the Mattaponi, the Upper Mattaponi and the Pamunkey Tribes;
- The adverse cultural, social, economic and ecological impacts to the Tribes are interrelated to the adverse impacts to the natural and physical environment that would result from the proposed King William Reservoir project; and
- The additive environmental effects of the project would be significant and would or may have an adverse impact on the Tribes that appreciably exceeds or would likely appreciably exceed the effects on the general population.

The City of Newport News claims that these effects are only perceived by the Tribes rather than being real and that the scientific reports they have compiled do not agree that such effects would actually result. Many of these effects might not be perceptible to non-Native Americans living in the same general area as the Tribes, but this does not lessen the impact felt by the Tribes. Rather, it highlights the disproportionate nature of such impacts. While the applicant's individual studies did not predict substantial direct impacts to the Mattaponi River and its resources from the single effects they evaluated, these studies revealed the lack of information concerning cumulative and indirect adverse impacts that would occur from the additive effects of these changes. The magnitude of these effects are unknown, and cannot be accurately predicted, especially in conjunction with other projects that may follow. Based on the discussions between the Tribes and the City to date, I have determined that the potential socioeconomic, cultural, and spiritual losses that the Tribes would suffer as a result of the construction of the reservoir and the withdrawal of water from the Mattaponi River could not be adequately compensated.

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(For a detailed discussion of the District's Environmental Justice analysis, see the District's report entitled "King William Reservoir Environmental Justice Analysis.")

9. Alternatives Considered in EIS: A total of 35 alternative components were identified and reviewed in the FEIS for their availability, cost, technological reliability, and environmental impacts. The RRWSG used a fatal flaw analysis, then applied a methodology based on the 404 (b) (1) Guidelines to screen the alternatives for "practicability." District staff had informed the RRWSG that this approach would not take the place of the Corps' 404 (b) (1) practicability analysis and public interest review which would be conducted after the close of the EIS comment period. The following is the list of alternative components as they appeared in the FEIS (Table 3-4). Alternative components 32 through 35 were added at the request of the District and the federal advisory agencies.

1. Lake Genito
2. Lake Chesdin
3. Lake Anna
4. Lake Gaston
5. Rappahannock River (above Fredericksburg)
6. James River (above Richmond)
7. City of Richmond Surplus Raw Water
8. City of Richmond Surplus Treated Water
9. James River (between Richmond and Hopewell)
10. Ware Creek Reservoir
11. Ware Creek Reservoir and Pamunkey, Mattaponi and/or Chickahominy River Pumpovers
12. Ware Creek Reservoir and James River Pumpover (above Richmond)
13. Black Creek Reservoir and Pamunkey River Pumpover
14. Black Creek Reservoir and James River Pumpover (above Richmond)
15. King William Reservoir and Mattaponi River Pumpover (KWR-I, KWR-II and KWR-IV)
16. King William Reservoir and Pamunkey River Pumpover
17. Chickahominy River Pumping Capacity Increase
18. Chickahominy River Pumping Capacity Increase and Raise Diascund and Little Creek Dams
19. Aquifer Storage and Recovery, Constrained by Number of Wells
20. Aquifer Storage and Recovery, Unconstrained by Number of Wells
21. Fresh Groundwater Development
22. Groundwater Desalination as the Single Long Term Alternative
23. Groundwater Desalination in Newport News Waterworks Distribution Area
24. James River Desalination
25. Pamunkey River Desalination
26. York River Desalination
27. Cogeneration
28. Wastewater Reuse as a Source of Potable Water
29. Wastewater Reuse for Non-Potable Uses
30. Additional Conservation Measures and Use Restrictions
31. No Action
32. Black Creek Reservoir and Mattaponi River Pumpover
33. Ware Creek Reservoir (Three Dam Alternative) and Pamunkey River Pumpover
34. Side-Hill Reservoir
35. Smaller King William Reservoir with Two River Pumpovers

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The City of Newport News executed a specific and detailed agreement with the King William County Board of Supervisors in November of 1990 for the King William Reservoir. The District staff learned of the existence of this host agreement in late 1993 or early 1994, but was unaware that it had actually been executed before the EIS process began. The District staff only learned of the date of the agreement in January 1998, when a copy was provided by an opponent of the proposal who had obtained it from Newport News through the Freedom of Information Act. Although the City of Newport News informed the District and the federal agencies that they were seeking the least environmentally damaging alternative through the EIS process, no matter what it might turn out to be, it appears that the King William Reservoir had already been chosen as their preferred alternative before the alternatives analysis was performed for the Draft EIS.

The RRWSG's screening resulted in the elimination from further consideration of all but six of the original 31 alternative components because they would either fail to meet the RRWSG projected needs, were too costly, the technology was considered experimental or there might be political problems in obtaining local approval. These six alternative components were combined to create three reservoir alternatives that would meet the RRWSG's projected 39.8 mgd deficit. The EIS carried forward for detailed review the following alternatives: a reservoir on Ware Creek between James City and New Kent Counties with pump-over from the Pamunkey River (alternatives 11, 21, 23, 30), a reservoir on Black Creek in New Kent County with pump-over from the Pamunkey River (alternatives 13, 21, 23, 30) and a reservoir on Cohoke Creek in King William County with pump-over from the Mattaponi River (alternatives 15, 21, 23, 30) which is the applicant's preferred alternative, and the No Action alternative (alternative 30).

The results of the applicant's screening analysis is presented on Table 3-4 of the FEIS. Based on the information provided by the applicant, the District and the federal advisory agencies generally did not disagree with the RRWSG's conclusions, but identified four more alternative components that should be reviewed in the FEIS (alternatives 32, 33, 34 and 35). The RRWSG's analysis also eliminated these alternatives from further consideration because they would either fail to meet the RRWSG's projected needs, were too costly or might not be acceptable to the host localities. In their 11 April 1996 letter commenting on the Draft EIS and Supplement to the Draft EIS, EPA stated their belief that several alternatives were eliminated from consideration without substantial justification including the Black Creek Reservoir with pumpover from the Mattaponi River and the King William Reservoir with pumpover from Pamunkey River alone. The federal advisory agencies questioned why it would be feasible to use a Pamunkey River pumpover for an expanded King William Reservoir, but not as the single pumpover option for the proposed King William Reservoir (alternative 16).

10. Alternatives Available to the Applicant:

a. Non-Reservoir Components of the RRWSG's Plan (alternatives 21, 23 and 30): The RRWSG's 2040 plan outlined in the FEIS provides for 23.2 mgd of safe yield from the King William Reservoir, 4.4 mgd from fresh groundwater and 5.7 mgd from brackish groundwater and 7.1 to 11.1 mgd from conservation and use restrictions. These alternatives were all reported by the RRWSG to be feasible. The combined safe yield of the non-reservoir components of this plan is 17.2 to 21.2 mgd. The City now claims that they would not be able to obtain permits for the 4.4 mgd fresh groundwater component of their plan and that without the reservoir, conservation measures and use restrictions would provide only 4.8 mgd of safe yield instead of the 7.1 to 11.1 mgd stated in the FEIS. Combined with the 5.7 mgd from their new groundwater desalination plant, the City reports that the non-reservoir

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components of their plan would only provide 10.5 mgd of safe yield benefit rather than the 17.2 to 21.2 mgd reported in the FEIS.

It should be noted that these groundwater and conservation alternative components were only considered in conjunction with the three reservoir alternatives and were not considered as components of any of the non-reservoir alternatives in the FEIS. The ability to conserve water should produce the same benefit no matter what other sources are considered to meet the need. In 1998, Newport News Waterworks brought on line their new \$17 million brackish groundwater desalination plant that will produce 5.7 mgd of their predicted 2040 deficit for \$1.20 for 1,000 gallons of water and is expected to cover their demand for about 10 years. Even if the City would not be able to obtain permits for the 4.4 mgd of fresh groundwater, they may be able to obtain permits for more brackish groundwater wells. According to the minutes from a Newport News City Council Work Session held on 8 February 2000, if the Corps permit is denied, the City might request that the State Water Control Commission allow them access to more groundwater for further desalination efforts.

(1) Groundwater (alternatives 21 and 23): It should be emphasized that the District is not advocating the additional use of groundwater to supply the region's need unless it is determined by the state to be appropriate. The District recognizes that over-reliance on groundwater resources can result in depletion of aquifers, land subsidence and the disappearance of wetlands that are supported by those aquifers. Decisions on the availability, quality, quantity and acceptability of groundwater sources rests with the state. However, the IWR panel believes that the RRWSG's estimated groundwater yields may be low compared to actual aquifer capacity.

James City County has been able to avoid their anticipated water supply crisis by implementing long-term solutions that do not require dependence on reservoirs. They have accomplished this by requiring more intense water conservation efforts (i.e., voluntary water conservation) and by planning for the construction of a 6 mgd groundwater desalination plant. In February 1998, James City County completed a feasibility study of a desalination facility which indicated that reverse osmosis treatment of groundwater from the Potomac Aquifer was feasible to supply their needs. James City County has indicated that if the King William Reservoir were permitted, they would contract with Newport News for at least 2 mgd and possibly another 2 mgd of water if it is available. However, the James City County Board of Directors approved a water supply plan to pursue the desalination facility if the Corps permit for the King William Reservoir was not issued by July 2000. James City County currently has block water rates of \$2.50 per 1,000 gallons for use of less than 15,000 gallons and \$2.60 per 1,000 gallons for use of more than 15,000 gallons but less than 25,000 gallons per quarter. These rates are less expensive than Newport News Waterworks' current rate of \$2.73 per 1,000 gallons and proposed rate of \$3.59 per 1,000 gallons by the year 2006. James City County has reported that the desalination plant would cost less to build than its portion of the cost of the reservoir would be (\$9 million per 1 million gallons), although the cost of the water itself would be more expensive. The City of Newport News has indicated that James City County's withdrawal from the project would not stop the project from going forward. However, it may be assumed that some, if not all of James City County's 4.4 mgd need would be met by their new groundwater desalination plant.

(2) Conservation (alternative 30): The Norfolk District and the federal agencies believe that the City of Newport News has underestimated their potential water savings from conservation. In their February 2001 report, the IWR panel also stated that the City of Newport News has underestimated the beneficial effects of conservation. The RRWSG's November 2000 water conservation analysis concluded

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that water conservation efforts above the regulatory driven new plumbing codes were not cost effective. They further claim that additional conservation efforts would not significantly reduce usage. According to the IWR panel, additional conservation through the retrofitting of older fixtures could reflect substantial savings. The new 1.6 gallon toilets represent a significant water savings over old fixtures using 5 to 7 gallons and even the now outdated 3.5 gallon low-flow fixtures. Rate restructuring and a rebate program for low flush toilets and plumbing retrofit could be considered as an incentive to reward conservative users. Furthermore, the effects of increased conservation as population increases should also be considered in the RRWSG's calculation of the long-term benefit of conservation as well as the potential for conservation at military and federal installations.

b. Other Non-Reservoir Alternatives: Certain non-reservoir alternatives identified in the FEIS to supply the RRWSG's stated 39.8 mgd need were not investigated in detail because they were eliminated early in the alternatives analysis for various reasons. If these alternatives are still available, they might provide additional incremental supplies as indicated by IWR or the entire RRWSG projected deficit as a one time project. With the limited information that is available at this time, there currently appear to be no significant or unacceptable adverse environmental impacts related to the following alternatives. When there is a need in the future or in the event that the RRWSG's risk of shortage is actually greater than IWR predicts, these sources, either separately or in combination, could potentially meet some or all of the shortage.

(1) Purchase of Surplus Treated or Raw Water from the City of Richmond (alternatives 7 and 8): The FEIS indicated that the City of Richmond surplus raw water would provide a safe yield benefit on the order of the Peninsula's stated deficit of 39.8 mgd, however a treated water safe yield benefit of 7.1 mgd instead was assumed. The RRWSG reported that the alternative was not feasible because the Richmond Regional Planning District Commission had taken a strong position against lower Peninsula withdrawals from the James River at Richmond. The FEIS indicated that the safe yield benefit of the City of Richmond surplus treated water would be 23.9 mgd. The RRWSG estimated that the cost of this alternative per mgd of treated water would exceed the RRWSG's adopted affordability criterion and the availability of this water was uncertain.

A study of the Richmond regional water demand was undertaken as part of the review of the proposed Henrico County Water Supply Intake. The City of Richmond and Henrico County developed a Regional Flow Management Plan (RMP) for the James River in the Falls of the James to protect instream resources in the region. As part of the plan, Richmond water treatment plant withdrawals would not exceed 150 mgd. The Henrico County water treatment plant was permitted to withdraw a maximum of 55 mgd. Henrico County currently purchases approximately 32 mgd from the City of Richmond. When the Henrico County Treatment Plant goes on line in 2002, Richmond would have this amount of water available for other users. The City of Richmond has indicated in the past that they intend to market this additional water to other users. Utilizing information collected for the Henrico County FEIS (July 1995), the Richmond regional demand projections would be 153 to 156 mgd in 2010. The combination of the Henrico County and City of Richmond water treatment plants could supply up to 205 mgd (150 mgd-Richmond and 55 mgd-Henrico) which leaves a surplus of 49 to 52 mgd which could be marketed to other users, including the RRWSG.

(2) Withdrawal of Freshwater from the James River Above Richmond (alternative 6): In the FEIS, the safe yield benefit of this alternative was estimated to be between 7.1 and 7.9 mgd. The RRWSG reported that this alternative was not feasible because of the Richmond Regional Planning

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District Commission's position against lower Peninsula withdrawals from the James River at Richmond. The RRWSG's estimated cost of this alternative per mgd of treated water would exceed their adopted affordability criterion. Also, the RRWSG determined that the intense competition between Richmond and Henrico County for James River water would severely delay their efforts to pursue this alternative.

The Regional Water Resources Plan for Planning District 15, dated December 1992, proposes to limit the major exportation of surface water to users outside the region, but does not preclude any of the water suppliers from marketing their excess water outside of the region. This plan specifically acknowledges the possibility that the RRWSG could obtain water from the James River:

"Regional Raw Water Study Group. To meet its projected water deficits of over 30 mgd by the year 2040, the RRWSG has identified numerous sources of water supply for possible use through the construction of new or expanded water intakes and pumping facilities. Some of the more significant of these proposals include: Lake Chesdin - 40 mgd intake; James River - 40 mgd intake in Chesterfield County above Boshier Dam; James River - new 40 mgd intake at the Richmond WTP to take surplus water; James River - purchase 20 mgd (30 mgd maximum) of treated water from the Richmond WTP"

Since the Richmond Regional Planning District recognizes the possibility of the RRWSG obtaining additional water from this region, it would not be prudent to eliminate this alternative for a smaller volume of water.

(3) Desalination of Brackish Water from the James River, the Pamunkey River or the York River (alternatives 24, 25, and 26: The FEIS reported that these alternatives would each provide a safe yield benefit of approximately 30 mgd.

(a) James River Desalination: The RRWSG considered treatment of the brackish James River water as experimental and technologically unreliable because of widely fluctuating salinity levels. They estimated that the cost per mgd of treated water would be higher than their adopted affordability criterion. Because the pesticide Kepone is known to be present in sediments in the James River below Hopewell, and could become re-suspended, the Virginia Department of Health considers this to be one of the least desirable of the RRWSG's proposed alternatives. The Department's position is that the best available source of water supply should be used. However, they informed the RRWSG, "We are, however, receptive to the use of raw water such as the James River below Hopewell in a situation where appropriate treatment is provided and it is well documented that no other source of potable water is available." Therefore, the RRWSG concluded that this alternative would not be practical. There clearly appear to be other raw water sources available to the RRWSG; however, it should be noted that the Health Department has not rejected the use of this water as indicated by the RRWSG.

(b) Pamunkey River Desalination: The RRWSG claimed that since this alternative did not include new raw water storage, and a likely river MIF would severely limit or preclude Pamunkey River withdrawals for extended periods, they concluded that the safe yield benefit would be negated and the alternative would not be feasible.

(c) York River Desalination: Due to raw water quality variability and treatment control concerns, and the lack of experience in treating water from a source of this type, the RRWSG considered the York River desalination alternative as experimental and not technologically reliable. Also, the

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RRWSG estimated that the cost per mgd of treated water benefit would exceed their adopted affordability criteria. The RRWSG claims that the use of desalination to produce potable water from brackish surface water remains experimental, and actual construction and operating cost data is lacking. Therefore, the cost analysis of these alternatives in the EIS was conducted using ocean based sources.

Desalination has been traditionally more expensive than the operation of a reservoir; however, as technology improves, the feasibility and cost effectiveness of the various desalination methods continue to increase. According to IWR, some methods, such as multi-stage flash distillation, are apparently both efficient and less expensive. Desalination is generally energy intensive and disposal of the brine from the desalination process also poses a potential environmental problem for fish and wildlife in the receiving waterway. However, brine discharged from the treatment of brackish water would not be as highly saline as from the treatment of seawater and could be diluted, possibly by mixing with wastewater, before being discharged. In the FEIS, the RRWSG reported 1994 costs between \$5.37 and \$6.14 per 1,000 gallons to desalt ocean water and predicted that desalting the brackish waters of the York River would cost as much as \$8.00 per 1,000 gallons. However, in a report dated 15 November 2000, the City of Newport News estimated that it would cost \$340.2 million to treat brackish water from the York River and \$382.0 million to treat salt water from the Atlantic Ocean. Therefore, it appears that brackish water desalination has now become less expensive than ocean water desalination.

According to the Corps's Institute for Water Resources, desalination by reverse osmosis became more economical in the early 1990's when computer management of the process allowed much greater efficiency. In fact, a desalination plant under construction by the Tampa Bay Water Authority in Florida for the year 2002 will reportedly produce 25 mgd for \$2.08 per 1,000 gallons of water over the next 30 years. Although Newport News Waterworks reported that the reservoir would produce water for \$1.23 per 1,000 gallons, they recently informed their customers that water rates would increase from the current rate of \$2.04 per hundred cubic feet of water to \$2.68 per hundred cubic feet of water by the year 2006 to pay for the King William Reservoir and other improvements. This converts to a current rate of \$2.73 per 1,000 gallons that will increase to \$3.59 per 1,000 gallons. Seawater desalination is generally more energy intensive and, therefore, more expensive than the desalination of the brackish surface water sources available to the City of Newport News. However, at the Tampa Bay plant, heated water from an adjacent power plant would require less energy to move through the desalination membranes and would reduce the operation cost. Without the power plant, the cost is estimated to be close to \$3.00 per 1,000 gallons, which remains less expensive than the cost to Newport News customers from the implementation of the King William Reservoir. More information on how treatment, delivery, management, overhead and construction costs are figured into these two cases would be necessary in order to draw a direct comparison between Tampa Bay and Newport News. However, these numbers clearly demonstrate that desalination is not the extravagant option it once was and may actually compare much more favorably to the cost of the King William Reservoir than previously estimated. Furthermore, the cost associated with additional water treatment facilities are included in the applicant's desalination analysis, but not in the other alternatives. The Sierra Club commented that the Lower Peninsula might be able to qualify for a 50% matching grant under the Water Desalination Act of 1996. Therefore, the rapidly improving technology of recent years has made desalination more cost effective and reliable than it has been in the past and it may be more attractive to the RRWSG by the time their need arises.

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c. Other Alternatives Considered:

(1) Wastewater Reuse for Non-Potable Uses (alternative 29): The Virginia Department of Health is opposed to any consideration of direct recycling of reclaimed wastewater as a source of drinking water and would approve indirect recycling only after all other alternatives have been examined and when it is determined to be the highest and best source available. The Department of Health could not support the RRWSG's proposed indirect recycle alternative 28 since the amount of dilution and detention that could be provided in the Harwoods Mill and Lee Hall Reservoirs would not be sufficient. However, the Department of Health has indicated their full support for the concept of non-potable reuse of reclaimed wastewater. Therefore, as other alternatives were undoubtedly available, the District did not require the RRWSG to further investigate potable uses of wastewater for the FEIS, but did encourage further analysis of non-potable reuse as an additional conservation measure.

The Hampton Roads Sanitation District (HRSD) has nine treatment plants that handle a total of approximately 150 million gallons of wastewater per day, which is cleaned and returned to the local waterways. As an alternative to disposing of this water, HRSD actively supports and encourages using this highly treated wastewater for non-potable purposes. According to HRSD, wastewater reuse is a relatively common practice throughout the country, but Virginia has been slow to adopt the concept. Furthermore, the cooperation of the localities is required for such a program to be implemented. The RRWSG's projected need could be reduced by as much as 1 mgd if two recent requests for non-potable reuse of reclaimed wastewater by large use customers were implemented.

HRSD recently initiated a pilot program at its James River and York River Treatment Plants to explore the industrial uses of filtered, chlorinated effluent. Both projects have received preliminary approval. HRSD would like to supply an estimated 0.48 mgd of effluent from the James River Treatment Plant for irrigation at Riverview Farm Park, a new recreational facility in Newport News. However the City of Newport News would not commit to the project because the City has its own well which would provide less expensive water for irrigation. Also, HRSD would like to supply 0.6 mgd of effluent from the York River Treatment Plant to the Virginia Power Plant and the Amoco Oil Refinery in York County for cooling generators, feeding boilers, washing down and for fire and dust suppression. HRSD offered to sell reclaimed water to Newport News Waterworks for resale; however, Newport News declined this offer. As a result, HRSD and Amoco may work directly to pipe the water the one mile distance from the treatment plant to the refinery. If these two projects had been considered, they would have reduced the RRWSG's projected need by almost 1 mgd.

The use of reclaimed wastewater to irrigate the athletic fields at Menchville School and at a proposed park on a closed landfill site has also been discussed. HRSD can apparently produce this water for \$1.50 per 1,000 gallons, which is very economical when compared to an average cost of \$2.50 per 1,000 gallons of drinking water. The greatest cost involved in implementing wastewater reuse is the required infrastructure because a separate system of pipelines and pumps is required. In a report dated 15 November 2000 the City of Newport News estimated that it would cost \$241.9 million to produce and transport wastewater as compared to \$167.9 million to build the King William Reservoir.

I acknowledge that Newport News and the other RRWSG member jurisdictions cannot require their users to incorporate wastewater reuse. However, such opportunities to reduce the demand for potable water for industrial processing and irrigation should be investigated and encouraged as an additional conservation measure. I recognize that opportunities for wastewater reuse will initially be limited; however, it could

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eventually represent a considerable reduction in the need for increased potable water supplies. Furthermore, the more users there are, the less expensive the reclaimed water will be and the more attractive the process will become to others. Preliminary projections indicate that wastewater reuse could be economically beneficial to the power plant and refinery. HRSD estimates that the savings to local industries could far outweigh the initial costs for the new process and infrastructure. HRSD has apparently received inquiries regarding wastewater reuse from industries that are considering locating in the area. Also, Virginia's commitment to the Chesapeake Bay Initiative for restoring water quality in the Bay will likely encourage non-potable wastewater reuse within the RRWSG's 50-year planning period. Therefore, the high probability that non-potable uses of wastewater could significantly decrease the future need for new potable water supplies should have been taken into account when calculating projected need for the area.

(2) Black Creek Reservoir and Pamunkey River Pumpover (alternative 13): The Black Creek Reservoir alternative would provide 18.1 mgd safe yield benefit. Like the King William Reservoir alternative, this alternative was considered in combination with 4.4 mgd from fresh groundwater and 5.7 mgd from brackish groundwater and 7.1 to 11.1 mgd from conservation and use restrictions for a total safe yield benefit of 35.3 to 39.3 mgd.

After the detailed delineation of the King William Reservoir site revealed a 653-acre wetland impact, the District and the federal advisory agencies announced to the RRWSG that the Black Creek Reservoir appeared to be the least environmentally damaging of the reservoir alternatives since it would impact the least wetlands (285 acres), involved no endangered or threatened species and few cultural resources. Shortly after the RRWSG was informed of this finding, New Kent County withdrew their cooperation and the RRWSG was unable to perform further environmental analysis of the Black Creek Reservoir alternative. The applicant suggested in the Draft EIS that the impacts of the Black Creek Reservoir would be greater than for the King William Reservoir, however this has not been substantiated since no further analysis of the Black Creek alternative was performed. The Black Creek Reservoir alternative was carried forward as a "No Action" alternative in the Supplement to the Draft EIS and the District proceeded with the best available information for the NEPA review.

As long as there are non-wetland alternatives that would meet the project purpose when the need arises, any alternatives involving wetland impacts would be presumed to be more environmentally damaging and unacceptable under the Corps regulations. Therefore, other reservoir alternatives such as Black Creek and Ware Creek that involve large wetland impacts could not be considered as the environmentally preferred alternative when non-wetland alternatives are available to meet the RRWSG's need. However, if non-wetland alternatives are not available and a reservoir is determined to be necessary in order to meet the RRWSG's future needs, a reservoir on Black Creek appears to be a practicable and feasible alternative (cost, technological reliability, etc.) As it was apparently eliminated for other than technical reasons that may not be insurmountable, it is possible that the Black Creek Reservoir alternative could once again become available to the RRWSG.

(3) Surplus Water from the City of Norfolk: In March 1999, the City of Norfolk reported to the District that it currently has between 32 to 45 mgd of surplus water, since the City of Virginia Beach started using water from Lake Gaston exclusively in 1997 and no longer buys water from the City of Norfolk. This alternative was not evaluated in the FEIS, and the exact amount of surplus and the length of time the water will not be needed by users in the southside of Tidewater has not been established. In

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the FEIS, the RRWSG evaluated the alternative of obtaining water from the City of Richmond, which is much farther distant than the City of Norfolk.

Therefore, the District wrote to the City of Norfolk on 22 March 1999 asking (1) Has Virginia Beach or any other users on the southside of Hampton Roads indicated a need for this surplus and a desire to obtain it from the City of Norfolk? (2) Would the City of Norfolk be able to supply treated or raw water to Newport News Waterworks to provide a treated safe yield of 23.2 mgd through the year 2040 and still meet its other expected obligations for that same period? and (3) Are there any restrictions on the sale of the City of Norfolk's water supply outside of South Hampton Roads? In a letter dated 5 April 1999, the Director of the City of Norfolk Department of Utilities, reported "In the past six years, Norfolk has discussed the possibility of using some of Norfolk's surplus water with several communities in Southside Hampton Roads. These discussions are ongoing." and "Our ability to supply all of the 23.2 mgd treated safe yield required by Newport News could depend on new commitments that might be negotiated with southside Hampton Roads communities to satisfy their future water needs. For Norfolk to supply either treated or raw water to Newport News will require, at the very least, new treatment and/or transmission facilities and the possibility of this has not been discussed with Newport News." He indicated that there are no restrictions on the sale of Norfolk's water supply outside of South Hampton Roads.

The City of Newport News wrote to the District on 24 March 1999 that the City of Norfolk surplus water should not be considered an alternative to satisfy the RRWSG's long-term needs because it will be required to meet the long-term needs of South Hampton Roads and because it was not considered as an alternative in the EIS scoping process. During scoping, the District and the federal agencies agreed not to require the RRWSG to consider as an alternative obtaining water from Lake Gaston, because at that time the outcome of the City of Virginia Beach's Lake Gaston pipeline permit was still in the courts and there was substantial doubt that the RRWSG would legally be able to obtain water from that source. A Lake Gaston alternative should not be confused with the surplus water that the City of Norfolk reported that they now have available from their other sources.

In a letter dated 2 April 1999, the City of Virginia Beach responded that they did not agree with the City of Norfolk's reported ability to provide a total of 95 mgd of safe yield from their system and calculated the figure to more likely be 81 mgd. The City of Virginia Beach projected a need for an additional 12 mgd of treated water supply at some point between 2010 and 2020 and believe that they would be a leading candidate for any additional surplus from the City of Norfolk.

The City of Chesapeake responded that they project a deficit of 10.4 mgd by the year 2040 based on maximum daily demand rather than average demand. Their water demand projections show that additional water would be required by 2015. Their options are to purchase additional surplus from the Cities of Norfolk and Portsmouth and/or develop an entirely new water supply project. The City of Chesapeake believed that the City of Suffolk and Isle of Wight County might also need some of the City of Norfolk's surplus in the next ten to fifteen years.

Although their comments had not been solicited, the Western Tidewater Water Authority (City of Suffolk and Isle of Wight County), informed the District on 2 April 1999 that they disagreed with the City of Norfolk's claim of a 32 to 45 mgd surplus. Their reasons were legal issues concerning the operation of wells within the City of Suffolk and the City of Norfolk's sole claim to the Blackwater River. They also stated their belief that the southside communities would need the surplus water within the next 40 years.

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The District has not suggested that surplus water from the City of Norfolk would meet the RRWSG's projected long-term need of 39.8 mgd. It is clear from these responses that some of the surplus will indeed be needed to serve the long-term needs of the southside communities. However, it appears that the surplus Norfolk water would be available in the short term and some may also be available in the long term and could serve at least some increment of the RRWSG's need when it arises. Corps authorization would be necessary for any pipelines or crossings affecting wetlands or waters of the United States. Generally, pipeline crossings do not result in major environmental impacts. Also, a portion of the pipeline could be attached to one of the bridges that cross the James River and involve less bottom disturbance. In a report dated 15 November 2000, the City of Newport News estimated that it would cost \$196.6 million to obtain surplus water from the City of Norfolk as compared to \$167.9 million to build the King William Reservoir.

11. Combined Adverse Environmental Impacts of the Project: While any one of the adverse environmental impacts alone may not lead me to a recommendation of denial, in combination, the adverse environmental impacts of the project, particularly the wetland loss and the adverse effects to an American Indian minority population, would be significant. The King William Reservoir would affect ecological processes both upstream and downstream of the dam and result in both short and long-term adverse effects on wetlands and wildlife habitats in Cohoke Creek and the Mattaponi River, which would lead to significant environmental degradation.

The reservoir would convert 1,526 acres of a highly diverse and productive system of wetlands, forests and streams and their wildlife communities into a monotypic, open-water lake environment favored by only a few lake-dependent species. Implementation of the proposed project would result in the loss of a generally undisturbed upland and wetland system (including 403 acres of vegetated wetlands and 34 acres of shallow open water), which provides high quality wildlife habitat as well as important water quality and flood control functions. The reservoir would flood a 17-nest great blue heron rookery, numerous beaver ponds and large uninterrupted tracts of bottomland hardwood forests and would eliminate migration, feeding and breeding habitat for wetland dependent species. The reservoir would impound 21 miles of free-flowing stream and would reduce the downstream flow of Cohoke Creek to one third of its natural volume. The dam would block the future restoration of anadromous fish passage on Cohoke Creek. The project would result in the alteration and degradation of 186 acres of wetlands and their associated wildlife habitat downstream of the proposed dam on Cohoke Creek. The proposed outfall location would result in unnecessary degradation to aquatic resources including wetlands, fisheries and benthic populations in 0.8 miles of low energy streambed below the proposed discharge point on Beaverdam Creek. The conversion of forested wetlands to emergent and scrub-shrub wetlands along the pipeline route would result in a permanent conversion of forested wetlands and fragmentation of habitat for some interior forest species. Forest fragmentation decreases the habitat value of the remaining forest to many species.

Potentially adverse alterations to salinity gradients could affect the diverse tidal freshwater marshes in the nearly pristine Mattaponi River. The proposal would result in adverse impacts to two federally listed threatened plant species. A population of the federally listed threatened small whorled pogonia would be flooded within the reservoir pool area in Cohoke Creek. Also, the U. S. Fish and Wildlife Service concluded that potential cumulative impacts of the project from erosion and sedimentation, long-term changes in salinity, competition, loss of habitat, changes in water quality and introduced invasive species could result in detrimental effects on the sensitive joint-vetch populations on the Mattaponi River, especially to those colonies in the vicinity of the proposed intake structure.

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The project has the potential to result in ecological impacts to anadromous fish populations in the Mattaponi River. Without the availability of basic descriptive information on temporal and spatial distribution, spawning and early life history stages of American shad in the Mattaponi River, the potential for ecological impacts from the project on the species or its critical habitat cannot be accurately assessed. While the applicant's limited study did not conclude that there would be significant and detrimental impacts to migratory fish populations in the Mattaponi River as a direct result of the construction and operation of the King William Reservoir, the study did not consider the potential for indirect ecological effects as the result of physiochemical changes on fish assemblages. These same changes could also affect other species of fish, and other plants and wildlife in the Mattaponi River.

The project would adversely affect 115 archaeological sites (92 in the reservoir, 18 in the pipeline route and 5 at the pump station and in the intake pipeline route). Between 72 to 79 of these sites are considered potentially eligible for inclusion in the National Register of Historic Places. The reservoir would be located between Virginia's only two American Indian Reservations, and the proposed intake on the Mattaponi River would be constructed approximately three miles upstream of the Mattaponi Reservation. The project has the potential to impact a sacred site, traditional hunting, fishing, trapping, gathering and religious practices, subsistence fisheries, and the way of life of the Mattaponi, Pamunkey and Upper Mattaponi Indian Tribes. Development around the reservoir would further reduce the land available to the tribes for hunting, trapping and gathering and additional recreational boat traffic on the Mattaponi River would interfere with traditional net fishing. The Mattaponi and Pamunkey Tribes have a spiritual connection to the Rivers which is not only vital to their economy but is essential to their historical and cultural identity. The importance of the natural resources of Pamunkey Neck to the livelihood of Native Americans emphasizes the significance of the impacts. Therefore, the project has the potential to result in disproportionately high and adverse environmental effects to this minority population as described by Executive Order 12898.

12. Extent and Permanence of Beneficial and Detrimental Effects:

a. Beneficial Effects: The regional cooperation between Newport News Waterworks and three other localities in the lower peninsula should reduce their competition for available supplies. The King William Reservoir would double the storage capacity of the current Newport News Waterworks system, would increase the Lower Peninsula's current treated water safe yield by one-third and would provide a second river basin as a new source of water, thereby decreasing effects from moderate droughts. The City of Newport News would benefit from the sale of water from the reservoir to their customers as well as to the other RRWSG members. The reservoir could provide 3 mgd of water to King William County and 1 mgd to New Kent County as hosts should these localities choose to build the necessary facilities to obtain the water. The reservoir would provide increased public recreational opportunities in the form of swimming, boating and year-round recreational fishing. The 1,526-acre reservoir would be stocked with forage and game species for freshwater recreational fishing. Also, camp sites, picnic areas and nature trails would be established around the perimeter of the reservoir. Hunting would also be allowed in the vicinity of the reservoir with certain restrictions. Lateral seepage from the reservoir could recharge the Yorktown aquifer and benefit local private wells; however, the exact effects on residential wells has not been investigated. King William County would benefit from the receipt of lease payments from the City of Newport News, and the generation of revenue from recreational, residential and light commercial development associated with the reservoir. The local area would benefit from additional temporary employment opportunities during the construction phase of the project.

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b. Detrimental Effects: Construction and backflooding of the dam would result in the permanent loss of wetlands, upland forests and streams in the Cohoke Creek watershed and the water quality benefits and wildlife habitat they provide. Impoundment of the upper portion of Cohoke Creek would result in degradation of wetland and riparian communities downstream of the dam due to attenuation of stream flows. A sustained increase in stream flow conditions would result in degradation of aquatic habitat downstream of the outfall on Beaverdam Creek. The conversion of forested wetlands to emergent and scrub-shrub wetlands along the pipeline route would result in fragmentation of habitat for some interior forest species and decrease the habitat value of the remaining forest. Cultural and socioeconomic impacts to the Mattaponi, Pamunkey and Upper Mattaponi Tribes would be expected from both the reservoir and the intake on the Mattaponi River. Increases in residential and commercial development would permanently affect the relatively unspoiled rural nature of King William County and would affect the Mattaponi Tribe's ability to hunt, trap and gather resources for their subsistence and religious ceremonies. Adverse effects from physical and chemical changes associated with the Mattaponi River withdrawal could seriously affect the state's ability to restore the American shad population in the York River basin and adverse effects to the shad fishery in the Mattaponi River could have significant long-term effects on the society and economy of the Mattaponi Tribe. The proposed dam would permanently block the potential restoration of fish passage for anadromous species in Cohoke Creek. The project would result in adverse impacts to a colony of the federally listed threatened small whorled pogonia and possibly to populations of the federally listed threatened sensitive joint-vetch. Adverse impacts could occur to the federally listed threatened bald eagle if the recommendations of the U. S. Fish and Wildlife Service and the Virginia Department of Game and Inland Fisheries to prevent disruption during the critical nesting period are not implemented.

13. Probable Impacts in Relation to Cumulative Effects Created by Other Past, Present and Reasonably Foreseeable Activities: The Chesapeake Bay watershed and the Tidewater area have experienced intense development which has resulted in declining wetland resources and significantly reduced natural diversity. Between 1956 and 1977, before the Corps had jurisdiction over wetlands under Section 404 of the Clean Water Act, Virginia lost nine percent of its inland forested wetlands. Data from the U. S. Fish and Wildlife Service indicates that between 1982 and 1989, Virginia experienced a net loss of more than 18,000 acres of wetlands, most of which have occurred in the Coastal Plain (where the King William Reservoir would be located.) According to the U. S. Fish and Wildlife Service, non-tidal forested wetlands such as those threatened by the King William Reservoir are the most rapidly disappearing wetland type in the Mid-Atlantic states. The need for further losses of this dwindling resource must be carefully weighed in the Corps' public interest review. Through the implementation of regulations and guidelines in the Corps' review process, significant wetland losses have been reduced and unnecessary losses have been avoided. The issuance of a permit for unjustified wetland losses of this magnitude would be contrary to the requirement to reduce cumulative impacts to these resources.

Approximately forty percent of the palustrine forested wetland losses were shown to be from reservoir and pond construction, which has resulted in a net gain in open water habitats. EPA believes that wetland losses from the proposed King William Reservoir would contribute significantly to ongoing cumulative adverse effects in the Chesapeake Bay, and that it is inappropriate to view these losses as offset by a gain in the open-water habitat of a man-made lake. According to the U.S. Fish and Wildlife Service, wetlands status and trends reports indicate that over 555,000 acres of ponds and reservoirs have been created in Virginia between 1956 and 1977, primarily at the expense of free-flowing rivers and streams. Therefore, populations of fish species dependent on riverine habitat in Virginia have suffered a decline in available habitat.

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In their letter dated 25 February 2000, EPA stated that wetlands of the Chesapeake Bay, the nation's largest estuary, should be considered a high national priority and commented, "The KWR project may contribute substantially to ongoing cumulative adverse effect in the Chesapeake Bay watershed and southeastern Virginia where urban development has already significantly reduced the diversity of natural communities." The U.S. Fish and Wildlife Service believes that the two-thirds reduction in freshwater input to the Pamunkey River from Cohoke Creek should be considered as a cumulative effect to the York River system. The Virginia Department of Game and Inland Fisheries believes that a withdrawal of this proposed magnitude in concert with other withdrawals could alter nutrient dynamics in the York River system and change the composition of organisms above and below the withdrawal point.

Other than the allowances for New Kent and King William Counties from the reservoir storage as host localities, the water supply needs of other municipalities within the Mattaponi and Pamunkey River basins have not been considered or provided for by the RRWSG's regional plan. (The 3 mgd allowance for King William County and 1 mgd allowance for New Kent County are not included in the RRWSG's safe yield calculations.) King and Queen County and Caroline County in particular have expressed concern that the withdrawal of so much water from the Mattaponi River will preclude their being able to obtain future water supplies from the River when their needs arise. Instream flow conditions to preserve the quantity and quality of water for the maintenance of fish and wildlife resources could limit any additional future withdrawals.

The need for these and other municipalities to develop additional water supplies could lead to further cumulative wetland and habitat losses if other reservoirs are planned. For example, New Kent County's treated water deficit has been reported to be 9.1 mgd by 2040. After declining to cooperate further with the RRWSG toward a reservoir on Black Creek, New Kent County announced its plans to seek a separate permit for their own reservoir at Black Creek. If both the King William and Black Creek Reservoirs were constructed, the cumulative losses of these two projects would exceed 700 acres of wetlands, 35 miles of streams and 1,400 acres of upland habitat.

Also, the King William County Businessman's Association reported that King William County could not ever take advantage of the 3 mgd host allowance in the King William Reservoir storage because they could not afford the costs outlined in the agreement to buy the water; therefore, they will need another water source to solve their future deficit. However, James City County indicated that if Newport News had not resolved the permit issue by the summer of 2000, they would satisfy their 4.4 mgd deficit by developing a groundwater desalination plant, which should have little or no impact to wetlands. James City County's plans for a facility with up to a 6 mgd yield are currently going forward.

The King William Reservoir itself could result in additional cumulative impacts through future expansion of the reservoir footprint and enhancement of the raw water pumpover as described below:

a. Expansion of the King William Reservoir: In view of the concerns of the District and other federal and state agencies over the loss of wetlands and wildlife habitat, the RRWSG elected to submit a revised permit application for the KWR-IV alternative. However, they remained convinced that from the perspective of a long-term regional public water supply, their preferred KWR-II alternative would be technically superior. The 11 March 1997 Addendum Number 3 to the Development Agreement between the City of Newport News and King William County contains a clause reserving the wetlands between the KWR-IV and KWR-II dam sites for possible future downstream reservoir enlargement. If permitted, a future reservoir expansion would destroy an additional 137 to 216 acres of wetlands and their associated

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fish and aquatic resources downstream of the currently proposed KWR-IV dam site to supply between 2.2 to 3.9 mgd of additional treated water. Although the RRWSG offered to place temporary conservation easements over the wetlands and adjoining upland habitat between the proposed KWR-IV dam and upstream of the existing Cohoke Millpond as a part of their mitigation plan, they have not agreed to preserve these areas in perpetuity.

Therefore, it appears that the City of Newport News intends to eventually impact a total of 574 to 653 acres of wetlands for the King William Reservoir. These downstream wetlands closely resemble those in the proposed impoundment area and possess a high level of diversity. The dam site was moved upstream to KWR-IV for the FEIS, so not all of the impacts of a reservoir at the KWR-II or KWR-I locations have been fully evaluated. Such an expansion, no matter how probable, is not included in the RRWSG's current application.

b. Enhancement of the King William Reservoir: Also, an additional 45 to 120 mgd pumpover from the Pamunkey River to augment the Mattaponi River withdrawal as described in the EIS should be viewed as a "reasonably foreseeable withdrawal" when considering cumulative impacts to the York River system from salinity intrusion. The reduction in freshwater flows must be considered in light of cumulative impacts to the Chesapeake Bay. Although the City of Newport News stated that they had no immediate plans to pursue the second pumpover, and the impacts of such a proposal were not evaluated in the EIS, they clearly have not abandoned the potential for such an option. In the 8 August 1995 Addendum Number 2 to the King William Reservoir Project Development Agreement between the City of Newport News and King William County, a Pamunkey River pump station is included to provide a second pumpover to the proposed King William Reservoir as a way to enhance the safe yield of the reservoir and to supply water to jurisdictions other than those composing the group as of March 1995.

The dual pumpover of the enhanced King William Reservoir project would supply between 6 to 15 mgd of additional treated safe yield benefit for as yet unidentified users. According to VIMS researchers Dr. Carl Hershner and Dr. Al Kuo, any freshwater withdrawal from the Pamunkey River will affect the salinity in the York River and thus, the salinity in the Mattaponi River since these rivers are hydrologically connected. EPA expressed concern regarding the long-term cumulative impacts of the proposed withdrawals and potential withdrawals on both river systems as well as the York River system. EPA believes that the City's plans for an additional pumpover appears to be an attempt to piecemeal the project. There is no assurance that other localities would join the enhanced project since their future short and long-term needs may be met by other water supply technologies. During a December 1994 meeting, the District staff learned that none of the localities that the RRWSG had contacted were willing to commit to participation in an enhanced King William Reservoir project. The enhanced King William Reservoir project was never officially proposed to the District; therefore, it was not evaluated in the EIS and its environmental impacts and alternatives are unknown. In addition, the RRWSG has indicated verbally that in order to meet needs in the reasonably foreseeable future, they will likely request modification of their DEQ permit to allow a higher maximum daily withdrawal rate from the Mattaponi River, or to implement the less restrictive 40/20 Tennant minimum flowby method. This change would increase the potential for cumulative adverse impacts to resources in the Mattaponi River.

14. Adverse Environmental Effects Which Cannot be Avoided Should the Proposal be Implemented: The proposed King William Reservoir would result in permanent wetland losses due to construction of the footprint of the dam and backflooding of the Cohoke Creek valley to establish an approximately 1,526-acre reservoir. The project would result in the direct and permanent loss of at least 21 miles of

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stream channel, 34 acres of open water habitat, 403 acres of non-tidal vegetated wetlands, and 1,089 acres of upland habitat. The project would result in the elimination of ecologically significant wetlands and floodplain that provide wildlife habitat, store storm flood waters and serve as a water quality buffer. A large, diverse complex of wetland and upland habitats that support a wide array of aquatic, semi-aquatic and terrestrial wildlife would be transformed into a monotypic lake environment favored by only a few species. While the applicant's mitigation plan could provide 2 to 1 replacement of wetlands, it would not achieve in-kind functional compensation.

Restriction of flows from construction of the proposed dam also would alter the sustaining hydrologic regime and associated biological, geological and chemical processes of the existing non-tidal wetlands downstream of the proposed reservoir site. This would indirectly and permanently alter 186 acres of downstream wetlands and the habitat they provide for wetland dependent species. The presence of a 78-foot high dam would permanently preclude the potential restoration of fish passage for anadromous species upstream of that point in Cohoke Creek. The reservoir would flood a 17-nest great blue heron rookery and the construction and operation of the outfall on Beaverdam Creek could adversely impact the nesting success of another 4-nest heron rookery.

Additionally, construction of pipelines to connect the new reservoir to the existing Newport News Waterworks distribution system and to provide for the proposed pumpover from the Mattaponi River would result in the permanent conversion of 10.4 acres of forested wetlands to emergent and/or scrub-shrub wetland cover types. The construction of a concrete and riprap outfall structure and the excavation of a 150-foot discharge channel on Beaverdam Creek would permanently destroy approximately 0.15 acres of vegetated wetlands. The sustained increase in average stream flow conditions of post project discharge flows would permanently degrade the stream dynamics and morphology by increasing erosion rates and adversely affect downstream wetlands, fisheries and benthic populations. Most, if not all, of these effects could be avoided by moving the outfall another 0.8 miles downstream to Diascund Reservoir.

A population of the small whorled pogonia, approximately 92 archaeological sites, and potentially a site of sacred significance to Native Americans in the Pamunkey Neck region would be permanently flooded by the reservoir. An additional 23 archaeological sites would be impacted by the intake and pipelines. The project has the potential to adversely affect the already depleted shad population in the Mattaponi River and to have indirect adverse effects on colonies of the sensitive joint-vetch located near the intake site. The project would result in permanent adverse effects to the way of life of Native American tribes by affecting their continued ability to obtain food and resources from the Mattaponi River and the Pamunkey Neck area.

15. The Relationship Between Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity: While the proposed reservoir and river pumpover would meet or exceed the applicant's projected water supply needs, the combined impacts of the project would result in a significant and adverse decrease in the long-term productivity of the estuarine system. The proposed King William Reservoir project would adversely affect ecological processes both upstream and downstream of the dam and have both short-term and long-term effects on wildlife habitat. A dramatic alteration in patterns of sediment transport and nutrient exchange which are vital to downstream ecosystems would be expected from the impoundment.

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A highly diverse and productive natural stream valley system of wetlands, streams and forests would be replaced with a man-made lake of low diversity and relatively low productivity. The aquatic environment of a man-made lake may provide a productive habitat for a few lake-dependent species, but literature has shown that their productivity and diversity usually decline over time. Furthermore, lakes that are managed for water supply are subject to frequent and sometimes very large drawdowns which further degrade the aquatic habitat provided by the lake environment. Although the King William Reservoir would provide a large freshwater fishery, it cannot be expected to possess the same functions and values as the highly diverse Cohoke Creek valley ecosystem.

There is little doubt that the removal of up to 75 mgd of freshwater from the Mattaponi River will have some effect on the ecology of the river. The City of Newport News claims there would be "little, if any, adverse effects." However, the potential exists for long-term effects on salinity and other chemical properties in the Mattaponi, Pamunkey and York Rivers. While it may be true that only minor effects would be anticipated from each individual elemental change, the combined and long-term permanent changes to the productivity of the system are expected to be significant.

16. Any Irreversible or Irrecoverable Commitments of Resources Which Would be Involved in the Proposal Should it be Implemented: There would be an irretrievable loss of the upper portion of an intact and functional ecosystem in the Cohoke Creek watershed. Irreversible effects to ecological processes both upstream and downstream of the proposed dam would result from the permanent and significant alteration of the flow pattern of Cohoke Creek. As proposed, the project would result in the elimination of 403 acres of vegetated wetlands and 34 acres of shallow open water and the wildlife habitat they provide as well as the displacement and/or destruction of their inhabitants, the inundation of approximately 21 miles of free-flowing streams and the reduction of the average flows to the Pamunkey River. The net reduction in freshwater discharge below the dam would restrict stream flows to about one third of the existing average flow and would result in adverse impacts to the wetland vegetation and the fish and wildlife that Cohoke Creek and Cohoke Millpond support. Wetland, upland and riparian habitat that provides food, cover and reproductive sites for the vast majority of species in the watershed would be irreversibly lost.

Approximately 10.4 acres of forested wetlands would be permanently converted to emergent and scrub-shrub wetlands for stream/wetland crossings along the pipeline route. Although the affected area would still be vegetated wetlands, a change in cover type due to clearing and continued maintenance of the utility corridor would result in a net loss of forested wetland function.

The outfall structure on Beaverdam Creek would permanently destroy approximately 0.15 acres of vegetated wetlands and the operation of the pumpover with an average 7-fold increase above existing flow conditions in Beaverdam Creek would adversely and permanently change stream dynamics. Changes in stream morphology would result and this low energy system would experience degradation due to sustained increases in flow volumes and velocities. Increasing the average stream flow condition from 4.5 mgd to 32.6 mgd would generate unacceptable levels of sustained flow volume on downstream stream aquatic resources, including vegetated wetlands, fisheries and benthic populations. Sustained flow volumes would increase rates of erosion and subsequent deposition of erodible materials (including highly erodible materials such as organics and silts), and will potentially decrease water quality downstream to Diascund Creek Reservoir.

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The Native American archaeological sites and possibly a sacred site that would be permanently flooded would represent an irretrievable cultural and spiritual loss to the Mattaponi, Pamunkey and Upper Mattaponi Tribes. The loss of traditional tribal hunting, trapping and gathering grounds within Pamunkey Neck would permanently and irreversibly affect the Mattaponi Tribe's ability to obtain food and other raw materials important to their culture and survival. Any adverse effects to the already depleted shad population in the Mattaponi River would be expected to affect the Mattaponi Tribe's shad hatchery and subsistence fishery. Such impacts would have a permanent effect on the tribe's historical uses of the land and the river.

The irreversible loss of the wetland and upland forested areas within the reservoir pool area would result in a permanent decrease in silvicultural activities, the permanent loss of a colony of the small whorled pogonia as well as the permanent displacement of a great blue heron rookery. The indirect adverse effects on populations of the sensitive joint-vetch in the Mattaponi River would be expected to be permanent as long as the intake remains in the river and is operational.

The District has developed monitoring protocols for the Mattaponi River and Cohoke Creek downstream of the dam which are intended to detect potential changes and to allow for a reevaluation of permit conditions to address adverse effects. However, it may not be possible to rectify some of the adverse effects, and some changes may not be detectable until the damage has occurred.

17. Comments and Recommendations of the Corps Federal Advisory Agencies: The King William Reservoir has remained controversial with the federal advisory agencies due to its associated adverse environmental impacts, especially the loss of extensive wetlands and wildlife habitat. There has been a high degree of agency cooperation to solve problems and develop solutions in the review of this application and full consideration of agency concerns in the District's decision-making process. Only comments received in response to the FEIS or later are included in this section. Where appropriate, earlier comments have been incorporated into other sections of this document.

a. U. S. Fish and Wildlife Service: In their letter of 25 July 1997 in response to the FEIS, the U.S. Fish and Wildlife Service recommended denial of the proposed King William Reservoir due to the project's impacts on 437 acres wetlands/shallow open water habitat, 21 miles of perennial and intermittent streams, 875 acres of forested wildlife habitat (not including 214 acres of early successional forest), alteration of 105 acres (later revised to 186 acres) of downstream wetlands, elevating salinity levels in the York River basin and impacting the federally listed threatened sensitive joint-vetch. The Service stated that these impacts are extremely detrimental to the fish and wildlife resources of Southeast Virginia and will result in substantial and unacceptable impacts to Aquatic Resources of National Importance (ARNI).

The Service expressed continued serious concerns over the integrity of the Mattaponi ecosystem following withdrawals for the King William Reservoir. They expressed concern for alteration of salinity gradients, and effects to the Mattaponi River's diverse tidal freshwater marshes, including the federally listed threatened sensitive joint-vetch. The Service stated "Based on the Service's extensive involvement evaluating the evolving wetland mitigation plan, we do not see the possibility that the applicant can adequately replace the wetland functions, contiguous habitat, and wetland types that the project proposed to impact." They clarified that their involvement did not equate to endorsement of the mitigation plan or of the project.

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The Service also expressed concern that the project would impact all or a portion of the wetlands downstream of the proposed dam due to the inappropriate flow regime proposed for reservoir releases which does not mimic natural flows. The Service continued to recommend that the pipeline to Diascund Reservoir be extended the entire length to avoid adverse impacts to Beaverdam Creek from irregularly high, potentially erosive flows. The Service requested an opportunity to review Dr. Garman's report in its original version before Newport News's editorial changes. The Service believes that the information on Mattaponi River fish communities is insufficient and that the applicant should be required to do further sampling to help tailor the River Monitoring Plan. The Service recommended 1 mm wedgewire screens on the intake with intake velocities not to exceed 0.25 feet per second. As mitigation for the reduction in anadromous fish habitat in Cohoke Creek, the Service recommended providing fish passage at a suitable location on another stream as a condition of the permit, if granted. The Service concurred with the Department of Game and Inland Fisheries concerning time of year restrictions for the great blue heron rookery and commented that the buffer recommendations around the reservoir proposed for bald eagles by the Service and the VDGIF should serve to compensate for inundation of the existing heron rookery. The Service commented that river salinity changes may profoundly affect the sensitive joint-vetch and that laboratory germination results may not duplicate conditions of a natural setting. The Service commented on the RRWSG's proposed management conditions for the bald eagle and recommended that the Service and the VDGIF be consulted for recreation and nature trail plans.

In a letter dated 22 July 1999, the U.S. Fish and Wildlife Service provided comments on the RRWSG's final wetland mitigation plan. The Service stated that the proposed mitigation plan is hydrologically and ecologically out-of-kind, separates the stream mitigation from the wetland mitigation and does not compensate for the loss of the Cohoke Creek stream valley wetland complex. The Service stated that "the stream valley wetland complex has been torn into two disjunct, ecologically disconnected components for mitigation purposes." The Service stated "...the mitigation proposed is significantly out-of-kind, and does not compensate for the loss of the Cohoke Mill Creek stream valley wetland complex." and "We have yet to understand how a stream valley wetland complex driven by a groundwater/surface water interface can be recreated." The Service does not believe that the final plan adequately addresses monitoring of the mitigation sites nor does it make a commitment to long-term hydrology rights from off-site sources for certain farm fields.

The Service believes that the RRWSG's proposed downstream releases do not avoid impacts to the functioning of wetlands downstream of the dam site. In their 22 July 1999 letter, the Service concurred with my preliminary position that there is a lack of demonstrated need to destroy 403 acres of wetlands and my concern for the combined adverse environmental impact that would result from the King William Reservoir and Mattaponi River intake. They also reiterated their recommendation that the Department of the Army permit be denied. The Service stated "These wetland systems are not a readily replaceable, mitigatable resource." and "The best compensation package in the world is not appropriate if avoidance of the wetland impact is a practicable option." Finally, the Service commented "Because of our overriding concern that the King William Reservoir has not been proven to be the least damaging practicable alternative, the Service believes that a very detailed examination of the applicant's Final (wetland mitigation) Plan is not warranted at this time."

b. U. S. Environmental Protection Agency: In their letter of 25 July 1997 commenting on the FEIS, EPA stated that despite the avoidance of 216 acres of wetlands with the KWR-IV configuration, and the RRWSG's good faith effort to resolve difficult issues, major outstanding environmental and cultural issues remained. EPA recommended the publication of a Supplement to the FEIS in order to

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provide full public disclosure on the project's effects on Environmental Justice, the presence or absence of Traditional Cultural Properties, address unresolved questions regarding salinity impacts to the flora and fauna of the Mattaponi River, and to incorporate the results of the Habitat Evaluation Procedures into the applicant's wetland mitigation plan.

EPA commented that the impacts related to the loss of 437 acres of diverse and valuable wetlands/shallow open water habitat within the Cohoke Creek basin would be significant. The wetlands provide multiple ecological functions ranging from water quality enhancement to wildlife migration, feeding and breeding habitat. These functions and the uniqueness/heritage values of these wetland ecosystems would be lost for many wetland dependent wildlife species and would not be sufficiently replaced by the open-water habitat of a 1,526 acre lake. EPA believes that the wetlands at the project site qualify as an Aquatic Resource of National Importance (ARNI) due to their diverse type, quantity and functional capacity. EPA also expressed concern that the downstream releases into Cohoke Creek did not mimic natural pre-project flows and that wetlands impacted by the pipeline construction were not addressed in enough detail in the FEIS.

EPA commented that the water deficit projections for the industrial sector appear to be too high, which apparently reflects insufficient movement towards reuse or recycling in new or existing industry. They recommended more progressive conservation strategies such as inclining block rates, aggressive reuse of non-potable water by industry and aggressive community outreach to promote water conservation.

EPA concurred with the District, the Virginia Department of Historic Resources and the Advisory Council on Historic Preservation that Traditional Cultural Properties of importance to the Mattaponi and Pamunkey Indian Tribes were likely to exist in the vicinity of the project and commented that this information would provide useful in the Environmental Justice analysis. EPA noted that although the Tribes' spiritual and cultural sense might be difficult for non-natives to grasp, the Environmental Justice analysis requires that they be taken seriously. EPA also commented that the impacts to treaty-protected resources and the Tribes' historical, cultural and spiritual interest in the artifacts that contain the archaeological record of the Tribes' history should not be overlooked in the Environmental Justice analysis.

In a letter dated 28 May 1998, EPA commented "The wetlands of the Cohoke Creek Watershed have been shown to be of high structural complexity and ecological value. These wetlands interspersed among uplands create a unique ecosystem complex with unique functions and values. Further, available literature on mitigation of palustrine forested and scrub-shrub wetlands indicates that these types are among the most difficult to replace." and "Site selection has targeted prior converted croplands as a means of restoring wetland functions. Although this approach has merit, these areas generally will not support wetter hydrologic regimes (e.g. PFO1E) such as those found throughout the Cohoke Mill Creek watershed."

In a letter dated August 18, 1998, EPA indicated that they would not be able to agree to issuance of a Section 404 permit until a superior, in-kind wetland mitigation plan is developed and again recommended the publication of a Supplement to the FEIS to include the final wetland mitigation plan as well as information the District had gathered since publication of the FEIS on project need, Traditional Cultural Properties, and Environmental Justice.

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In a letter dated 5 August 1999, EPA wrote to inform the District that based on the Institute for Water Resources assessment of the project's purpose and need, EPA believed that the King William Reservoir may not represent the least damaging practicable alternative to water supply deficits in the Lower Peninsula. They stated that the applicant's final wetland mitigation plan (May 1999) has not fully prescribed to the mitigation sequencing which stresses avoidance of adverse impacts as the first step in mitigation planning.

In this letter, EPA maintained their position that due to the diverse type, quantity and functional capacity of the wetlands at the project site, they would qualify as an Aquatic Resource of National Importance (ARNI) in accordance with Part IV 3(a) of the Clean Water Act Section 404(q) MOA between EPA and the DOA. Because the diverse wetland communities at the site have been shown to have high structural complexity and ecological value, EPA believes it may be extremely difficult, if not impossible, to adequately replace them and that there is an ecological risk associated with compensatory mitigation. Therefore, EPA believes that a more rigorous monitoring schedule than proposed in the applicant's May 1999 plan should be incorporated in the Corps permit, if one is issued.

In a letter dated 25 February 2000, EPA stated "The context of the project; the Mid-Atlantic Region, Chesapeake Bay Watershed, tidewater Virginia, are all areas experiencing intense development pressure and declining wetland resources, the intensity of the impacts (KWR represents the largest permitted loss of wetland in the mid-Atlantic region) and uniqueness of the region from an ecological and cultural perspective, combine to make this project one of the most significant projects Region III has ever worked on." (The mid-Atlantic region consists of Pennsylvania, Maryland, Delaware, Virginia and West Virginia.) "The importance of these natural resources to the Native American tribes in the area and the public at large makes the impacts related to the KWR project take on a larger significance. These impacts cannot be considered insignificant, even with the mitigation measure in place and fully functioning."

c. National Marine Fisheries Service: The National Marine Fisheries (NMFS) submitted comments dated 12 March 1996 in response to the Supplement to the Draft EIS. No comments were received from NMFS on the Final EIS. The NMFS commented that because anadromous and semi-anadromous fish populations in the Mattaponi, Pamunkey, and Cohoke Creek drainages are currently low, significant impacts to these species are not tolerable. They commented that strict intake protection from impingement and entrainment of eggs and larvae is critical. Therefore, they maintained their support for the use of 1.0 mm wedge wire screens with intake velocities not to exceed 0.25 fps. The NMFS expressed concern that the proposed 3 mgd releases from the King William Reservoir would reduce the Cohoke Creek streamflow to one-third of the average streamflow and there may not be sufficient water to maintain acceptable fish habitat downstream of the dam. They also questioned the RRWSG's claim that the proposed discharge into Beaverdam Creek would be beneficial to aquatic organisms. The NMFS commented that the introduction of regular high flow events in the Creek would change the species composition structure over the long term. They also expressed concern that stream channel erosion could be significant, even if the released high flows stay within their banks. Their site inspection revealed that the streambed of Beaverdam Creek contains soft fine substrate material which could be readily eroded by high water events. Therefore, they recommended moving the outfall to Diascund Reservoir.

18. Views of Other Federal and State Agencies and Representatives:

a. Virginia Department of Environmental Quality (DEQ): The Virginia DEQ issued its Virginia Water Protection Permit/401 Certificate on 22 December 1997. The permit imposed a more restrictive

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minimum instream flow for the Mattaponi River than the one the RRWSG proposed, set a higher minimum downstream release from the dam into Cohoke Creek and placed maximum limits on interbasin transfers from the King William Reservoir to the other Newport News reservoirs. These conditions were imposed to ensure that the proposed activity would be consistent with the provisions of the Clean Water Act and protect instream beneficial uses. DEQ's decision to impose these conditions was based, at least in part, on the state's determination that the applicant's need would be up to 13 mgd less than the RRWSG projected. Among the factors that contributed to this figure are: high unaccounted-for water losses, continued availability of the Big Bethel Reservoir, low estimation of groundwater supplies in James City County and questionable calculation of available supply as dead storage in the various reservoirs in the Newport News system. DEQ stated in their comments on Supplement to the Draft EIS, "The 30.2 mgd demand deficit is the product of numerous assumptions, nearly all of them favoring the construction of the largest project." Nevertheless, DEQ urged me to support the King William Reservoir in my Record of Decision.

In an internal memorandum dated 20 February 1997, DEQ indicated that they proposed stricter withdrawal and transfer conditions for their VWP because they were concerned that Newport News would over-rely on the Mattaponi River when existing sources would prove adequate. DEQ remarked that such conditions were standard in other VWP water supply permits and would prevent Newport News from using Mattaponi River/King William Reservoir water for purposes other than those stated in their application. DEQ's memo went on to state that minimizing long-term transfers from the Mattaponi River would minimize salinity changes and preserve water for future users. Without these long term limits, DEQ believed that surplus Mattaponi/King William Reservoir water could potentially be sold to other localities or used to provide water to other pumped storage projects. DEQ cited the following sections of state law as their authority to impose conditions to regulate minimum instream flow and volumes of water withdrawn: Section 62.1-11 states: (a) Such waters are a natural resource which should be regulated by the Commonwealth. (c) "The waste or unreasonable use or method of use should be prevented" (e) The right to the use of water or to the flow of water in or from any natural stream, lake or other water course is and shall be limited to such water as may be reasonably be required for the beneficial use of the public to be served; such right shall not extend to the waste or unreasonable method of the use of such water; and Section 62.1-44.15:5 states: (b) Conditions contained in a Virginia Water Protection Permit may include, but are not limited to, volumes of water to be withdrawn.

Newport News claimed that the DEQ permit was unfairly restrictive, reducing by as much a one-third the amount of water they could withdraw from the Mattaponi River. They stated that DEQ's required Minimum Instream Flow and other conditions of the permit would "cripple the project." Although the City filed suit against DEQ to have these restrictions removed, they did not appeal the court decision that upheld the DEQ permit.

In a letter dated 23 July 1999, DEQ wrote to the District disagreeing with the conclusions of the Draft IWR report on the water needs of the lower peninsula using almost the exact wording found in Newport News' 16 July 1999 "Lower Peninsula Water Needs: A Summary Response and Rebuttal to Institute for Water Resources 'Special Study' May 1999."

b. Virginia Department of Health: In a letter dated 24 June 1997, the Virginia Department of Health submitted comments in response to the Final EIS. The Health Department stated that Newport News Waterworks and their RRWSG partners have not increased their sources of supply as quickly as the area served has grown and the Department has required Newport News Waterworks to seek additional

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sources of water. The Department stated that their criteria stipulate that when a waterworks reaches a set percentage of permitted capacity, they make preparations to increase their capacity. The Health Department stated that one of their goals for the Waterworks is that they obtain the largest and best quality of water that is reasonably available because permitting for new sources is so cumbersome and time consuming.

The Health Department listed the applicant's proposed King William Reservoir with pumpover from the Mattaponi River (alternative 15) at the top of their list of preferred projects. The other options in their list in order of preference were: the King William Reservoir with pumpover from the Pamunkey River (alternative 16), and Black Creek Reservoir with pumpover from the Pamunkey River (alternative 13), Lake Genito (alternative 1), Lake Chesdin (alternative 2), Lake Anna (alternative 3), Lake Gaston (alternative 4), Chickahominy River pumping capacity increases and raise Diascund and Little Creeks Dams (alternative 18), and Chickahominy River pumping capacity increases (alternative 17). The Health Department commented that alternatives 10, 11 and 12 involving a reservoir at Ware Creek had been made moot by the EPA veto. Alternatives 19-28, involving aquifer storage and recovery, development of fresh and brackish groundwater wells, river water desalination, cogeneration and wastewater reuse as a source of potable water, were considered to have associated unknowns including limited ability to provide the needed volume, technological limitations, possible loss of health protection, and public acceptance. Wastewater Reuse for Non-Potable Uses (alternative 29), was considered a conservation measure which has been slow to show a major reduction in potable water needs. Water from the Rappahannock River above Fredericksburg (alternative 5), James River above Richmond, (alternative 6), surplus raw water from the City of Richmond (alternative 7), surplus treated water from the City of Richmond (alternative 8), the James River between Richmond and Hopewell (alternative 9), Black Creek Reservoir with James River pumpover (alternative 14), additional conservation measures (alternative 30), and No Action (alternative 31) did not seem viable to the Health Department as they either move potable water from one system to another, present extreme treatment problems, or do not address the need for additional sources. Brackish groundwater desalination in the Newport News Waterworks Distribution Area (alternative 23) has been implemented by Newport News Waterworks.

It should be noted that the Department of Health's stated preferences of the water supply alternatives is based on water quality and quantity to satisfy minimum health requirements. Their conclusions are, therefore, potentially quite different from those of the Corps of Engineers, which must conduct a public interest review and alternatives analysis that balances the need for the project against its adverse environmental impacts.

In a letter dated 23 July 1999, the Department of Health wrote to me disagreeing with the conclusions of the IWR report using the same tone and almost the exact wording found in Newport News' 16 July 1999 rebuttal referenced above. The Department of Health stated that their 19 May 1994 letter under Virginia Waterworks Regulations 12 VAC5-590-520 had notified Newport News that their water production had consistently exceeded 80% of their permitted capacity since June 1989 and that they should provide a schedule for increasing capacity. They stated their belief that without the King William Reservoir, the entire area would be thrown into a water crisis. Virginia regulation 12VAC5-590-520, Waterworks Expansion states, "At such time as the water production of a community waterworks reaches 80% of the rated capacity of the waterworks for any consecutive three-month period, the owner shall cause plans and specifications to be developed for expansion of the waterworks to include a schedule for construction..." and 12VAC5-590-690, Capacity of Waterworks states, "The design capacity of the waterworks shall exceed the maximum daily water demand of the system."

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c. Virginia Department of Game and Inland Fisheries: In a letter dated 14 July 1997, the Virginia Department of Game and Inland Fisheries (VDGIF) submitted comments on the Final EIS. VDGIF stated their continued support for the development of other alternative water sources including fresh groundwater and groundwater desalination and they made several recommendations to reduce the adverse impacts of the proposed King William Reservoir proposal. They continued to recommend that the modified 80% Exceedence Minimum Instream Flow schedule be used for the Mattaponi River withdrawal rather than the applicant's proposed 40/20 Tennant method. VDGIF commented that the proposed release would represent only one-third of the normal flow in the Cohoke Creek. VDGIF indicated that research has shown reductions in stream flow of this magnitude would adversely impact aquatic biota and significantly impact downstream wetlands. As they believed the applicant's proposed downstream release would not adequately protect the integrity of fish populations and wetlands in Cohoke Creek, and may significantly impact water levels in Cohoke Millpond, VDGIF recommended that the release be increased to maintain median monthly flows. They also recommended release of 75% epilimnetic water between June and October to prevent temperature shock and oxygen depletion that could stress and kill fish and recommended that temperature and dissolved oxygen be monitored below the dam.

VDGIF commented that the Final EIS did not evaluate the impact of the increased frequency of high flows in Beaverdam Creek and that it is highly likely that increased flows will increase erosion, especially during periods of high flow. Therefore, they continued to recommend that the discharge point on Beaverdam Creek be moved to Diascund Reservoir. VDGIF continued to recommend 1.0 mm wedge wire intake screens with through slot velocities not to exceed 0.25 ft/sec, as well as a time of year restriction for all construction activities in the Mattaponi River from 15 February to 30 June to protect spawning anadromous fish. They concurred with the applicant's proposal to provide off-site fish passage for blueback herring and alewife and requested coordination with VDGIF for site selection and design. They recommended time of year restrictions on pipeline construction through the open field east of bald eagle nest site number 3 from 15 November through 15 July and that all nests should be protected by a management zone of 750 feet. No human activity or habitat alteration, including construction, should occur in this zone during the nesting season from 16 November through 15 July. Also, all of the forested reservoir shoreline should be protected by a management zone that extends at least 330 feet inland and prohibits clearcutting, land clearing and construction. The applicant's proposed management zone and its governing rules should be established in cooperation with the VDGIF and the U. S. Fish and Wildlife Service.

d. Virginia Department of Conservation and Recreation Division of Natural Heritage (DCR-Natural Heritage): In a letter dated 18 July 1997, the DCR-Natural Heritage provided comments on the Final EIS. The DCR-Natural Heritage made numerous comments toward improvement of the applicant's wetland mitigation plan, and disagreed with many of the statements in the Final EIS which claimed that the project would have minor impacts to the natural resources in the Cohoke Valley and the Mattaponi River. The DCR remained concerned about the effects of salinity intrusion on the significant wetland communities and sensitive joint-vetch populations along the Mattaponi River and continued to question the results of the salinity model. They commented that upper estuary communities can suffer from even slight salinity changes because they are often already at the limit of their physiological tolerances. Due to the potential for additional future withdrawals from the Mattaponi and Pamunkey Rivers, they recommended modeling multiple, concurrent withdrawals to predict changes in salinity. They commented that the applicant's proposed downstream release would not mimic the natural hydrograph below the dam and recommended the use of the Range of Variability Approach to determine the release that will provide adequate flows. The DCR disagreed with the applicant's conclusion that there would be

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no impacts on the sensitive joint-vetch and the reservoir would “greatly expand local bald eagle habitat.” They expressed concern that backwashing of the intake pipe could impact the sensitive joint-vetch. In addition, DCR commented that the planned development and recreational activities around the reservoir would discourage nesting, roosting and foraging of bald eagles since eagles require substantial stretches of undisturbed forested shoreline. DCR stated that contrary to statements in the Final EIS, Hanover County is indeed pursuing a water withdrawal project on the Pamunkey River and recommended that the cumulative effects of such a withdrawal on the Pamunkey River be taken into consideration.

e. Governor of Virginia: In a letter dated 8 June 1999, Virginia Governor James S. Gilmore, III stated his concern over my 4 June 1999 preliminary position that the King William Reservoir is not needed. He urged me to determine that the reservoir is necessary and to issue a permit for the project as the state had already done. In accordance with the provisions contained in 33 CFR Part 325.8 (b)(2), when the district engineer's recommended decision is contrary to the written position of the Governor, of the state in which the work will be performed, the application must be referred to the division engineer for resolution. In another letter dated 21 April 2000, Governor Gilmore informed the District that Dr. E. Anne Peterson, State Health Commissioner, would be the primary point of contact responsible for communicating the Commonwealth's perspective on unmet water needs in the Newport News area as well as the Commonwealth's comprehensive water planning policy.

f. Virginia Secretary of Natural Resources: In a letter dated 25 August 1999, the Virginia Secretary of Natural Resources, John Paul Woodley, Jr. wrote to me to reemphasize the Commonwealth's position of support for the proposed King William Reservoir and their disagreement with the conclusions of the IWR report. As further support for the state's position, Mr. Woodley stated that if the King William Reservoir had been in place during the recent drought, under the conditions of the DEQ permit, very little water could have been taken from the Mattaponi River over the past 13 months, thereby protecting its aquatic life. Mr. Woodley encouraged me to reconsider and reverse my preliminary position to deny the permit.

g. U.S. Senator Charles S. Robb: In a letter dated 12 April 1999, former Senator Robb wrote to me seeking the status of the permit application on behalf of one of his constituents, Mr. Larry E. Parker.

A letter dated 2 March 2000 was received jointly from former Senator Robb, Senator Warner, Congressman Scott and the late Congressman Bateman requesting that the District's record on the King William Reservoir permit application remain open for comment until they had an opportunity to meet with General Rhoades, Commander of the North Atlantic Division, to discuss the procedures that would be followed when the final decision is referred to the Division. Subsequent to that meeting, General Rhoades provided instructions to the Norfolk District in a letter dated 21 April 2000 that outlined the procedures to be followed for completing the review and forwarding the District's recommendation on the permit application to the Division.

h. U.S. Senator John Warner: Senator Warner was a signatory to the 2 March 2000 letter to the District described above.

i. Congressman Herbert H. Bateman: In a letter dated 26 July 1999, the late Congressman Bateman informed me that he had read Newport News' rebuttal to the IWR report and was even more convinced of the need for the King William Reservoir. Congressman Bateman was also a signatory to the 2 March 2000 letter to the district described above.

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j. Congressman Robert C. Scott: Congressman Scott was a signatory to the 2 March 2000 letter to the District described above.

19. Summary of Public Comments Received on the Environmental Impact Statement: The King William Reservoir project has engendered enormous controversy and public opposition ever since it was identified as the RRWSG's preferred alternative. While only approximately 100 letters were received in support of the project, approximately 4,315 letters and postcards and 12 petitions (with 1,792 signatures) were received from the public expressing opposition to the project. All letters received from the general public were reviewed and all comments were given full consideration in my recommended Record of Decision. The level of public involvement and scrutiny of the project has been extremely high. Environmental groups active in the Chesapeake Bay region including the Sierra Club, the Chesapeake Bay Foundation, and the Southern Environmental Law Center, as well as a local conservation organization, the Mattaponi and Pamunkey Rivers Association, have presented an informed opposition to the project based largely on the wetland impacts and impacts related to withdrawals from the Mattaponi River. Several of these groups, as well as the King and Queen County Board of Supervisors, hired their own experts and provided substantive comments on numerous aspects of the project, notably the applicant's need for the water and the validity of the salinity study. The District's re-evaluation of the water need issue was prompted by these highly technical critiques of the RRWSG's methodologies. Some of the fiercest opposition to the King William Reservoir came from the citizens of King William County and King and Queen County, many of whom formed a grassroots organization against the project called the Alliance to Save the Mattaponi. Many of these citizens perceive the reservoir and withdrawal as the City's attempt to take their land and water. The proposed reservoir is located approximately 50 miles from the lower Peninsula communities it would serve.

The public expressed concerns very similar to those of the District, the federal advisory agencies and state agencies on such issues as alternatives, need for the water, impacts to cultural resources and traditional cultural properties, anadromous fish, water quality, wetland impacts, fish and wildlife impacts, mitigation and Environmental Justice. The public also identified a number of other pertinent issues which are either addressed in this section or in other sections of this document. Other issues not pertinent to my recommended decision have not been individually addressed. Comments from the public brought to the attention of the District several factual errors, omissions and instances of conflicting information and pointed out where inadequate or outdated information had been used in the EIS. In general, the public commented that the project would result in significant and uncompensated impacts to natural resources in the Cohoke Valley and the Mattaponi River. Impacts associated with the City of Newport News' plans for potential future expansion of the King William Reservoir were also of great concern.

King William County: As the reservoir would be located approximately 50 miles from the lower Peninsula communities it would serve, many citizens of King William County felt the City of Newport News is wrongfully taking their land and their water, leaving little water for future development needs within the watershed. Because the project does not reflect watershed based planning, the citizens fear that the proposed withdrawal would effectively preclude other jurisdictions and riparian owners from using the Mattaponi River as a water source. This is especially of concern during periods of dry weather, when they fear the proposed withdrawal schedule would transfer all surplus water over the minimum instream flow to the lower peninsula, leaving little or none for use of Mattaponi watershed farmers and residents. This would force more reliance on groundwater wells which may themselves prove inadequate during dry periods. Also, because DEQ will not permit any significant discharges into the river for a distance of 5 miles of the intake, future development on the river could be substantially affected.

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Some citizens are concerned that anything that will affect regional groundwater would affect their residential wells. An alteration of the existing groundwater flow velocity pattern and a increase in lateral seepage due to the rise in the water table is anticipated; however, the exact effects on residential wells have not been investigated. Many citizens commented that the project would be counter to the intent of the Chesapeake Bay Act, and would destroy the potential for Federal Scenic River designation. As many crops cannot tolerate brackish water, several farmers who irrigate their crops with water from the Mattaponi River expressed concern over the threat of salinity intrusion.

Native Americans: Comments received from the Mattaponi Tribe, the Pamunkey Tribe, the Upper Mattaponi Tribe, the Virginia Council on Indians and the United Indians of Virginia have expressed opposition to the project from the unique perspective of Native Americans. In addition to citing many of the same environmental concerns expressed by environmental groups and the general public, the Native Americans objected to the project because of its impacts to their culture and livelihood. The Mattaponi Tribe believes that their subsistence shad fishery and hatchery would be lost or irreparably harmed and that their culture, traditional practices and way of life would be adversely affected by the project. The Pamunkey Tribe expressed concern over the loss of cultural resources and disturbance to Native American burial sites. These tribes have used the rivers and surrounding land of Pamunkey Neck for centuries and derive from them not only food, but also socioeconomic benefit and their spiritual identity.

The Mattaponi Tribe also believes that the Treaty of 1677, which ceded the Pamunkey Neck to the Native Americans, would be violated by the construction of the reservoir in Cohoke Creek. The Mattaponi Tribe claims that since one arm of the reservoir would encroach within 3 miles of their reservation, it would be in violation of the articles of peace which provided for a cessation of English confiscation of Indian lands and established a 3-mile buffer zone around all Indian towns to separate the colonists from the Indians. A portion of the pipeline route would also fall within 3 miles of the Pamunkey Reservation. In a letter dated 3 June 1997, the Virginia Attorney General stated his concurrence with the RRWSG's contention that since the need for the buffers ceased years ago, it was no longer pertinent. Also, other non-Indian properties already exist within the 3-mile buffers. For over 350 years, the Tribes have presented their yearly payment of taxes or "tribute" of beaver pelts, wild turkey and deer to the Governor of Virginia at Thanksgiving in accordance with the treaty. The Tribes feel that they have honored their commitment, but by issuing the DEQ permit for the construction of the King William Reservoir, the Commonwealth of Virginia has not kept its pledge.

It is important to note that these are not federally recognized tribes, although they have been seeking that status. The Treaty of 1677, made with King Charles II of England, is held by the Commonwealth of Virginia, not by the federal government; therefore, any Corps permit decision could not violate the treaty. However, the Norfolk District has made every effort to keep the Tribes informed and to involve them where appropriate and has treated the tribes as though they were federally recognized to the extent allowed by applicable statutes and regulations.

King and Queen County: In letters dated 29 April 1997 and 18 July 1997, the King and Queen County Board of Supervisors commented that the proposed reservoir does not represent a "regional approach" with "the greatest cumulative benefits and least overall impacts within the region" as claimed by the RRWSG. Instead, it would greatly benefit the lower Peninsula region at the expense of the middle Peninsula region. The County stated that the project fails to take into account the future needs of King and Queen County in terms of agriculture, industry, commerce, recreation and residential development. King and Queen County also provided two independent critiques of the applicant's salinity study that

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questioned its validity, and applicability to the river system. Furthermore, the County disputes the RRWSG's reported location of the boundary between King William County and King and Queen County on the river and claims that the withdrawal structure would be located within King and Queen County. As such, they believe they should have been considered as a host community for the withdrawal.

Caroline County: In a letter dated 25 July 1997, the Caroline County Board of Supervisors stated their opposition to the King William Reservoir because it would restrict their ability to obtain their "fair share" of water from the Mattaponi River. They commented that the applicant used a 10-year old study which no longer accurately reflects Caroline County's consumptive needs to determine how much water Caroline County would need in the future. They feel that groundwater systems in the County will be inadequate to meet their demand within the next few years and predict that by 2014, they will need their own surface water source to meet their demand. They are also opposed to wetland mitigation sites being located in Caroline County for a project that is of no benefit to the County.

Dr. John B. Dawson: Dr. Dawson wrote on 22 July 1997 that new developments in the Virginia Department of Health policy allows wastewater recycling for potable uses by indirect recharge. Dr. Dawson commented that Tertiary treatment to render wastewater fit for drinking is being accomplished at the Occoquan Reservoir in Northern Virginia and could be done here as well. Therefore, Dr. Dawson suggested that alternative 28 should be considered as a viable alternative by Newport News. He believed that treatment plants in Henrico, Hanover and Williamsburg could potentially be re-fitted to provide tertiary treatment. According to the Virginia Department of Health, advanced treatment of existing raw and treated sewage discharges into the Occoquan Reservoir was determined to be economically superior to transporting the treated effluent out of the watershed area as a way to protect public health. This was a solution to an existing water quality problem rather than a means of providing additional water supply.

In a letter dated 29 July 1997, the Virginia Department of Health stated their position for developing any new water supply, "When developing new sources of water supply, use the highest and best source (combination of highest quality and best quantity) first." Based on this principle, the Health Department would be opposed to direct recycling of reclaimed wastewater as an immediate water source. Indirect recycling where reclaimed wastewater is discharged into a natural system to provide dilution and detention (i.e., the discharge is separated from the intake in time and space) would be recommended only after all other alternatives are examined and indirect recycling is determined to be the highest and best source available. The Health Department stated that they would, therefore, not automatically reject the concept of indirect recycle, but would evaluate each proposal on a case specific basis. The Department did not support the applicant's Alternative 28, as it would not provide sufficient dilution and detention. However, they indicated that they would evaluate any other indirect recycle scheme provided sufficient details are available.

During a 15 August 1997 meeting between the District, the Virginia Department of Health, the Virginia Department of Environmental Quality, the Hampton Roads Sanitation District and Newport News Waterworks, alternatives for indirect recycling were discussed and the District requested that the RRWSG provide the necessary information necessary for the Health Department's consideration. Accordingly, the RRWSG considered two possible locations for treated wastewater discharge (upstream of Diascund Reservoir on Diascund Creek or Beaverdam Creek, or upstream of Walker's Dam on the Chickahominy River) to benefit the Newport News Waterworks raw water supply system and provided an analysis indicating that such a project would not be able to provide a long enough hydraulic retention time within the receiving waterway (according to current California guidelines for similar projects). As the Health

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Department would likely impose more stringent blending ratios to compensate for the low retention time, the RRWSG calculated that the safe yield would be reduced to 8.5 mgd and the costs per safe yield benefit would exceed the RRWSG's affordability criterion. As other sources of potable water are clearly available to the RRWSG, this concept would probably not be considered acceptable by the Health Department. Therefore, the District did not require further consideration of this alternative, but continued to encourage wastewater reuse as an additional conservation measure.

Mr. Howard Potter: While not opposed to the reservoir project, Mr. Potter wrote on numerous occasions of his concern that the continued withdrawal of groundwater would contribute to the subsidence of shorelines and wetlands in the Chesapeake Bay watershed. He also provided much historical documentation of the continued occupation of Pamunkey Neck by Native Americans.

20. Comments Received from the City of Newport News: Since the announcement of my preliminary position in June 1999, the City of Newport News has submitted numerous reports and other documents in support of their proposal. All of the information submitted has been reviewed and fully considered in my evaluation of the proposal. Specific comments on each issue have been addressed throughout this document.

By their own admission, most of the information in the summary reports on environmental and cultural resources impacts that the City of Newport News submitted since I announced my preliminary position on 4 June 1999 were reiterations of previously submitted information. These documents only present the benefits of the project and claim that the project will have little, if any adverse impact on the environment. Many of the City's claims are speculative and unsupported. After reviewing the applicant's August 1999 "Environmental Issues Summary", EPA commented in a letter dated 25 February 2000, "...the Summary report does not represent a balanced and reasonable evaluation of the project and its environmental impacts...it fails to consider the Cohoke Mill Creek watershed as a integrated functioning ecosystem but rather evaluates it piecemeal...does not 'balance' the discussion of the benefits of a reservoir on Cohoke Mill Creek, with a discussion of adverse impacts." EPA concludes, "The Summary represents well calculated bits of information submitted by the RRWSG to support the KWR project. It selects information and data favorable to the KWR project while ignoring data that might present another view. The natural resources under consideration do not exist in isolation nor can they be so conveniently separated from each other for purposes of impact assessment."

In a recent letter dated 30 November 2000, the City of Newport News submitted their "Applicant's Proposed 404 (b) (1) Analysis." It is unusual for an applicant to submit their own analysis of the 404 (b)(1) Guidelines. The Corps uses EPA's 404 (b)(1) Guidelines in evaluating discharges of dredged or fill material into waters of the United States under Section 404 of the Clean Water Act. The Guidelines apply to all 404 permit decisions and are not just advisory, but are actual regulatory requirements. A permit for placement of fill material into waters of the United States cannot be issued if the project is not in compliance with the Guidelines except under 404 (b)(2), which allows the Secretary of Army to issue permits given consideration to the economics of anchorage and navigation.

The Guidelines specify that no discharge will be permitted if it will cause or contribute to the significant degradation of waters of the United States. The Corps determines if a project would have significant adverse effects on human health and welfare; life stages of aquatic life and wildlife; the aquatic ecosystem diversity, productivity, and stability; and recreational, aesthetic and economic values. The Guidelines are

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the substantive criteria used to make a decision on issuance or denial of a permit and the Corps has the sole responsibility for determining whether or not a project complies with the Guidelines.

The City of Newport News has stated that information contained in the EIS should be considered completely accurate and final and that the District should not change its determinations with regard to findings stated in the EIS. However, this notion runs contrary to the concept of NEPA to solicit comments and input from the public regarding the issues presented in the EIS. When the district's determination of particular issues changes to the point that additional public involvement is necessary, NEPA documentation is supplemented. This is exactly what happened in this case when the District determined that a supplement to the Draft EIS was necessary. Until a final decision is made, analysis of any particular issue is incomplete.

Although the difference between the "administrative record", the "project file", and documents responsive to the City's FOIA request was clearly outlined in the District's letter of 21 November 2000, the City of Newport News misunderstood the explanation and as an enclosure to a letter dated 30 November 2000, sent several of the documents obtained under their Freedom of Information Act request back to the District "... to ensure that they are in the record." Other documents were also enclosed which the City considered relevant to the District's review of their application for the King William Reservoir including permit decisions on other projects reviewed in the Norfolk District (Ware Creek Reservoir and Lake Gaston Pipeline) as well as permit decisions in the Wilmington District (Coddle Creek Reservoir). In an earlier report entitled "Comparison of King William Reservoir Project with Recently Permitted Reservoirs in the Southeastern United States," which was submitted on 24 August 1999, the City argued that the King William Reservoir would be less environmentally damaging per unit of water supply benefit than other reservoir projects in Virginia (Ware Creek Reservoir and Beaverdam Swamp Reservoir), North Carolina (Buckhorn Reservoir Expansion and Coddle Creek Reservoir) and Georgia (Horton Creek Reservoir, and Upper Towaliga River Reservoir). As these documents were submitted by the City in support of this permit application, they were reviewed by the District.

Although each district must comply with the same federal regulations and guidelines, outwardly similar projects may receive completely different permit decisions. As each project has its own unique need, environmental impacts, socioeconomic issues, agency concerns and project alternatives, such a comparison of different projects, both between and within districts, is a futile and irrelevant exercise. The Norfolk District has considered the King William Reservoir permit application on its own merits, and in accordance with regulation, has compared it only to appropriate alternatives to the proposed action and not to past projects, even if they were similar.

Regarding the Lake Gaston Pipeline, the State of North Carolina had alleged that the Norfolk District granted Virginia Beach a permit to develop a water supply that would be risk free, to the environmental detriment of the lower Roanoke River ecosystem. After reviewing Virginia Beach's supporting documentation, the District agreed with the City that impacts from the Lake Gaston Pipeline would be minimal. Concerns over the effect of the water withdrawal on downstream striped bass were analyzed and found to be largely unsubstantiated, but a permit condition was added that fully mitigated the potential impact. The District's finding that project impacts were insufficient to warrant preparation of an EIS was subsequently borne out after extensive litigation. While the District did not use the same deficit projecting methodology with the Lake Gaston Pipeline project as with the King William Reservoir project, the District reviewed and discounted both high population growth projections (which favored Virginia Beach) and low ones (submitted by North Carolina) and chose to rely on a more defensible,

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moderate growth projection also supported by the Commonwealth of Virginia. When project impacts are small, a less rigorous permit evaluation is justified (33 CFR 320.4(a)(2)(ii); 40 CFR 230.6(a)&(b)), 230.10).

The Ware Creek Reservoir project posed no impacts to any American Indian tribes. Also, the District was convinced at the time of that permit decision that no water supply alternatives existed that were practicable and less environmentally damaging. The permit review of the Ware Creek Reservoir project predated the Corps/EPA policy of mitigation sequencing (first avoid wetlands, then minimize wetland impacts, and only then compensate for any remaining wetland impacts), as well as the federal government's current policy of 'no net loss' of wetland functions and values. Under today's standards and policies, the gross wetland impacts of the Ware Creek Reservoir (without mitigation) would be compared against other alternatives, not the net wetland impacts (with mitigation). Also, the Ware Creek Reservoir's proposed wetland mitigation plan would be viewed today as being woefully inadequate based on our current understanding of wetland functions, values, and effective compensation. Finally, the principal water supply alternative recommended at that time that avoided wetland impacts was desalination, but in the mid-1980s desalination technology was unreliable, not well tested, and extremely expensive. Advances in technology and the state of the art since that time have made desalination a viable alternative in many cases. If the Norfolk District's analysis of the Ware Creek Reservoir project was less rigorous than our analysis of the King William Reservoir project, it was due to a combination of different project impacts, different rules and policies, and different technological capabilities.

The City also incorrectly assumed that because they followed the District and federal agency guidance and direction, that the outcome of the permit review process would automatically be in their favor, although they had been repeatedly advised against such an assumption throughout the processing of the application. Over the years, the Norfolk District staff has repeatedly informed the applicant of the major impediments to obtaining approval of their particular preferred alternative, yet the applicant has continued to press forward with their proposal. The applicant has expended a great deal of public funds in order to provide the information required for the District's review of their application as well as in their rebuttal of my preliminary position. According to the City, this has cost the RRWSG's taxpayers in excess of \$16 million dollars. However, such an expenditure cannot be considered as justification for permitting a project, if the issuance of a permit has been found to be contrary to the public interest.

21. A Discussion of Conformity With the Guidelines Published for the Discharge of Dredged or Fill Material in Waters of the United States (40 CFR, Part 230): The placement of fill material in vegetated wetlands and free-flowing streams for the construction of the proposed impoundment of Cohoke Creek is considered a discharge of fill into waters of the United States. Therefore, an evaluation of the chemical and biological effects of the proposed fill activity was conducted in accordance with the 404 (b) (1) Guidelines formulated by the Environmental Protection Agency and published in Volume 45, Number 249 of the Federal Register, dated 24 December 1980.

Subpart C - Potential Impacts on Physical and Chemical Characteristics of the Aquatic Ecosystem:

Substrate: The proposed King William Reservoir would convert 21 miles of free-flowing streams, 403 acres of forested, scrub-shrub and emergent wetlands, and 34 acres of open water to a deep water man-made lake. Fill material for the construction of the dam itself would displace some wetlands, while most

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would be inundated by backflooding. However, the physical integrity, environmental characteristics and values of the entire 437 acre wetland/open water complex would be lost.

The placement of the pre-cast concrete outfall structure, riprap apron and the excavation of a discharge channel would displace only 0.15 acres of wetlands. However, the addition of an average of 32.6 mgd of flow to the channel of Beaverdam Creek would result in an average 7-fold sustained increase above existing average flow conditions. This increase would adversely and permanently change stream dynamics and stream morphology in the 0.8 miles of creek substrate below the outfall. This sustained increase in flow volumes would increase erosion rates, turbidity and subsequent deposition of highly erodible silt and organic materials downstream.

The placement of a concrete foundation and riprap for the intake structure on the Mattaponi River would alter the substrate elevation of a small area and result in changes in water circulation and current patterns. The discharge of fill material to backfill the pipeline trenches for stream/wetland crossings would convert approximately 10.4 acres of forested wetlands to emergent and scrub-shrub wetlands. The affected area would still be vegetated wetlands if pre-disturbance contours are restored; however, there would be a loss of forested wetland function associated with a change in cover type from the clearing and continued maintenance of the utility corridor. This conversion would change the physical and biological characteristics of the wetland substrate and result in fragmentation of the forest habitat. Evaluating these conversion impacts as permanent wetland impacts is consistent with the Corps' current policy for utility line projects when wetland cover type conversions in easements will be continually maintained.

Suspended Particulates/Turbidity: Suspended particulates and turbidity would be temporarily elevated during construction of the dam in Cohoke Creek, the intake structure in the Mattaponi River, the outfall structure in Beaverdam Creek and the many stream/wetland pipeline crossings. However, a sustained increase in turbidity would be expected from the increased flow regime downstream of the outfall structure.

The placement of the proposed intake structure in the Mattaponi River would result in changes in water circulation and current patterns that may cause a minor change in erosion or accretion of the adjacent marshes and potentially affect suitable habitat for the federally listed threatened sensitive joint-vetch. The increased flow regime from the peak discharge of 50 mgd at the outfall in Beaverdam Creek would result in substantially increased erosion rates and scouring of the natural channel and wetlands along the affected 0.8 miles of the creek especially during periods of high natural flows.

The impoundment of the naturally flowing streams in Cohoke Creek would reduce the magnitude and duration of flood flows, interrupt downstream sediment and nutrient delivery and adversely affect the natural maintenance and expansion of downstream wetlands. Long-term reduction in sediment load would affect channel formation and nutrient cycling dynamics.

Water: Changes in temperature would be expected to result from the conversion of the upper Cohoke watershed from a natural, dendritic, riverine system with associated vegetated wetlands and forested riparian buffer to a large unshaded open water reservoir. Temperature influences the chemical properties of natural water bodies (e.g., amount of dissolved oxygen), which in turn can greatly limit the ability of plants and animals to utilize these waters.

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The water intake structure on the Mattaponi River would withdraw up to 75 mgd of water from the river. A sustained withdrawal of such magnitude would result in increased salinity and other changes in chemical properties of the water that would have the potential for indirect ecological effects on plants and fish and wildlife resources in the river. Freshwater withdrawal may result in changes to water chemistry, including concentrations of macro-and micro-nutrients such as nitrogen, phosphorus, potassium, iron, cobalt and dissolved organic carbon as well as major inorganic elements such as chloride, sodium, magnesium, sulfate, calcium, and bicarbonate. No matter how slight the changes might be, they would be permanent and would have a long-term, additive effect on plant and animal resources in the Mattaponi River and could irreversibly alter the natural habitat of freshwater plants and animals. Long-term and indirect adverse impacts to water chemistry in the Mattaponi River could affect resources in the Pamunkey and York Rivers as well.

Also, an additional 45 to 120 mgd pumpover from the Pamunkey River to augment the Mattaponi River withdrawal as described in the EIS should be viewed as a “reasonably foreseeable withdrawal” when considering cumulative impacts to the York River system from salinity intrusion. Although the City of Newport News stated that they had no immediate plans to pursue the second pumpover, they clearly have not abandoned the potential for such an option, as a Pamunkey River pump station is included in their agreement with King William County. This additional sustained withdrawal would result in further increases in salinity and other chemical changes and further ecological effects on resources in the Pamunkey, Mattaponi and York Rivers.

Lateral seepage from the reservoir due to the rise in the water table could recharge the Yorktown aquifer and benefit local private wells. However, potential effects on the quantity and quality of residential wells water has not been investigated.

Current Patterns and Water Circulation: The discharge would result in the following secondary effects to aquatic resources:

The proposed King William Reservoir would obstruct the natural flows from a large portion of the upper Cohoke Creek watershed, including headwater drainages and associated wetlands, and would significantly alter the water circulation patterns both upstream and downstream of the dam. The net reduction in freshwater discharge below the dam would restrict stream flows and impair the downstream transfer of sediments and detritus especially to those wetlands associated with the mainstem of Cohoke Creek located between the proposed dam and the existing Cohoke Millpond. Nitrogen and phosphorus loading concentrations are predicted to significantly increase over the current loading concentrations in the Cohoke Creek watershed.

Organic inputs and the processing of detritus would be severed for much of the Cohoke system, especially for those wetlands associated with the mainstem of Cohoke Creek downstream of the proposed dam and upstream of Cohoke Millpond.

The addition of an average of 32.6 mgd of flow to the channel of Beaverdam Creek would result in an average 7-fold sustained increase above existing flow conditions. This sustained increase would adversely and permanently change stream dynamics and stream morphology in the 0.8 miles of creek substrate below the outfall and would increase erosion rates, turbidity and subsequent deposition of highly erodible silt and organic materials.

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The presence of the intake structure in the Mattaponi River would be an obstruction to flow that would alter current flow and circulation patterns and may affect shoreline erosion and accretion patterns in the immediate vicinity of the structure.

Normal Water Fluctuations: The reservoir would impound 21 miles of free-flowing stream and would reduce the downstream flow of Cohoke Creek to one third of its natural volume. The flow pattern of Cohoke Creek would be significantly and permanently altered and the downstream wetlands would be starved of the natural flows, as well as sediment and particulate organic matter (detritus) especially during peak flow events. Water level fluctuations and periodic drawdowns associated with reservoir operation would decrease the wildlife use and habitat value of any potential aquatic fringe.

The sustained increase in flow events in the 0.8 miles of Beaverdam Creek below the outfall will occur at a frequency in orders of magnitude above natural conditions. The increased flows would adversely and permanently degrade channel morphology and would increase erosion rates, turbidity and subsequent deposition of highly erodible silt and organic materials. Decreased water quality from resulting turbidity would be detrimental to existing fish and invertebrate populations.

Salinity Gradients: The withdrawal of 75 mgd of water from the proposed intake structure would alter salinity gradients. A very small increase (0.1 to 0.2 ppt) in the mean annual salinity levels was predicted to occur as a result of the withdrawal and the VIMS report anticipated little or no upriver shifts in the distribution of existing wetland vegetation as a result of the predicted one kilometer upstream salinity shift. Although the actual salinity increase was predicted to be greater downstream, the percentage of change would be more significant upstream where the existing salinity approaches zero. While these increases might appear small, they would be sustained for as long as the withdrawal exists and would exacerbate any natural salinity increases during times of drought and/or during periods when the wind pushes the tidal water farther upstream. VIMS addressed only the predicted spatial distribution of existing wetlands, and did not evaluate the effects of the upstream salinity shift on any fish and wildlife resources or endangered and threatened plant or animal species.

Both the Fish and Wildlife Service and the Virginia Department of Conservation and Recreation indicated that some organisms and life stages have a low threshold for negative effects from chronic exposure to increased salinity or higher frequency of occurrence. During certain life stages, some species may be harmed by acute salinity impacts that would occur during maximum pumping events. Organisms in the low-salinity upper estuary may be particularly vulnerable to impacts from very slight changes in water chemistry as some of these freshwater and estuarine species may already be at the edge of their physiological tolerance. Even a change in salinity as slight as 0.1 ppt could cause a significant decrease in growth and reproduction for these organisms. Also, a variety of plant metabolic processes, including germination, nutrient uptake, productivity, seed production, and community establishment are known to be affected by salinity. Salinity is an important growth-limiting factor in wetland species and the effects of salinity on function and anatomy may vary during various plant developmental stages.

Subpart D - Potential Impacts on Biological Characteristics of the Aquatic Ecosystem:

Threatened and Endangered Species: In their Biological Opinion, the U. S. Fish and Wildlife Service concluded that flooding of the reservoir would eliminate a population of the federally listed threatened small whorled pogonia and that the construction and operation of the proposed intake structure on the Mattaponi River could result in indirect impacts to colonies of the federally listed threatened sensitive

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joint-vetch from erosion and sedimentation of sensitive joint-vetch beds. The Service believes that there is also the potential for cumulative indirect long-term impacts to various stages of the vetch's life cycle from changes in salinity and water quality, competition, loss of habitat, and introduced invasive species.

All of the known nests of the federally listed threatened bald eagle in the vicinity of the project are beyond the designated 0.25-mile radius buffer within which human activities could disturb eagles or degrade their habitat; therefore, the Service concluded that if noise disturbances are not excessive, the proposed reservoir construction would not be likely to adversely affect the bald eagle at the King William Reservoir Site. However, because bald eagles are particularly sensitive to noise and other disturbances from human activities, the construction of the pipeline would be incompatible with successful nesting and foraging. Both the Service and the Virginia Department of Game and Inland Fisheries recommended time of year restrictions to avoid disruption to bald eagles during the nesting season. Also, bald eagles may be present on some of the proposed wetland mitigation sites and along the re-aligned pipeline route.

The applicant has agreed to the Service's recommendations for the small whorled pogonia and three of the six recommendations for the sensitive joint-vetch. During informal consultation, the applicant had developed a management plan to minimize impacts to the bald eagle. However, in their Mitigation Program, Fish and Wildlife Mitigation Plan, their proposals for the sensitive joint-vetch and the bald eagle no longer include these measures.

The bald eagle was not included in the consultation under Section 7 of the Endangered Species because the Service's concerns over potential impacts to bald eagles were resolved through the informal consultation process. The Service concluded that neither the proposed action nor its cumulative effects are likely to jeopardize the continued existence of the small whorled pogonia and the sensitive joint-vetch. A "no jeopardy" opinion means that this one action alone would not lead to the extinction of the entire species, even though there may be harm, functional impairment or destruction of an individual population of the species.

The conclusions of the Secretary of the Interior under Section 7 of the Endangered Species Act concerning the impacts of the discharge of dredged or fill material on threatened and endangered species and their habitat are considered final for the proposed impact area. However, additional consultation may be required for the proposed mitigation sites and the re-aligned pipeline route.

Fish, Crustaceans, Mollusks and Other Aquatic Organisms in the Food Web: The inundation of wetlands and streams in the proposed reservoir pool area would eliminate habitat for wetland dependent fish and invertebrate species. Although the proposed King William Reservoir would provide spawning and nursery habitat for the resident fish species that are able to survive in that system, a conversion of the natural and productive riverine wetlands to an artificial and relatively unproductive open water habitat would lower species diversity and may lead to reduction in overall biological productivity. According to Dr. Greg Garman, non-native fish stocked in the King William Reservoir would very likely escape into the Pamunkey River, and could eventually become established in the Mattaponi River. These non-native fish could impact native fish in the rivers, including American shad, by predation and competition.

Impounding a large portion of the headwaters and associated riparian areas of Cohoke Creek would result in a severe alteration to the flow regime and would significantly reduce the amount of organics that are transported to, and support fish and aquatic organisms in the downstream portions of Cohoke Creek. The proposed reservoir and Mattaponi pumpover would result in elevated levels of dissolved nitrogen and

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phosphorus in the reservoir pool area and potentially to downstream portions of Cohoke Creek. In particular, the phosphorus concentration is estimated to increase by an order of magnitude, which could lead to problems with accelerated eutrophication within the proposed reservoir and downstream reaches of Cohoke Creek. Insufficient or poor quality water releases from the dam would affect the downstream habitat and inhabitants. Furthermore, construction of the 78-foot high dam would permanently block the potential restoration of anadromous fish passage on Cohoke Creek upstream of the proposed dam. The City of Newport News has conditioned their Development Agreement with King William County to reserve the wetlands between the KWR-IV and KWR-II dam sites for future downstream expansion of the reservoir. If permitted, a future reservoir expansion would destroy an additional 137 to 216 acres of wetlands and their associated fish and aquatic resources downstream of the currently proposed KWR-IV dam. Although the RRWSG offered to place temporary conservation easements over the wetlands between the proposed KWR-IV dam and upstream of the existing Cohoke Millpond as a part of their overall mitigation plan, they have not agreed to preserve these areas in perpetuity.

Changes in salinity levels of the Mattaponi River water as a result of the proposed raw water intake would affect adults, juveniles and eggs of fish, including shad and other anadromous fish. Some organisms and food particles smaller than 1 mm screen openings would be sucked into the intake and removed as a food source for fish and other aquatic organisms in the Mattaponi River. Such a loss would be expected to decrease the overall productivity of the riverine system.

As existing fish and invertebrate populations in Beaverdam Creek below the proposed outfall location are adapted to an average flow of less than 5 mgd, continuous flow events of 32.6 mgd or continuous peak flows of 54.5 mgd would likely change long-term species composition. Also, excessive turbidities would reduce water quality in the Diascund Reservoir and Diascund Creek and affect the anadromous fish that Diascund Creek supports.

Other Wildlife: Adverse impacts on aquatic wildlife habitat for resident and transient mammals, birds, reptiles and amphibians would result from the loss of approximately 403 acres of vegetated wetlands, 34 acres of shallow open water and 21 miles of stream corridor. The reservoir would flood a great blue heron rookery, numerous beaver ponds and large uninterrupted tracts of bottomland hardwood forests. Habitat that provides food and shelter as well as breeding and nesting sites, protective cover from predators and travel corridors for a wide variety of wetland dependent species would be eliminated. Many species inhabiting the flooded area would be forced to relocate to other areas of similar habitat, if available and not already at or near their carrying capacity. Less mobile species, including reptiles and amphibians, are not likely to be able to relocate to suitable habitat and would not survive.

Approximately 10.4 acres of forested wetlands along the pipeline route would be permanently converted to emergent or scrub-shrub wetlands which could result in fragmentation of habitat for some interior forest species. Reduced habitat from forest fragmentation could result in decreased breeding success and an overall population reduction. The right-of-way could also allow the introduction of edge species, which compete with or prey upon interior forest species. Furthermore, these disturbed areas may become dominated by more tolerant exotic and invasive species which would further degrade the wildlife habitat and overall biological productivity. Beaver ponds and a small great blue heron rookery could be adversely impacted by the construction and operation of the proposed outfall on Beaverdam Creek.

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Subpart E - Potential Impacts on Special Aquatic Sites:

Sanctuaries and Refuges: No impacts are anticipated.

Wetlands: The proposed fill for the construction of the dam and backflooding of the reservoir pool area would result in the direct and permanent destruction of 403 acres of non-tidal vegetated wetlands, 34 acres of open water and 21 miles of perennial and intermittent stream channels. These aquatic resources have been identified as Aquatic Resources of National Importance (ARNI) by the U.S. Fish and Wildlife Service and EPA. The biological productivity, wildlife habitat, storm flood retention capacity and water quality buffering of these ecologically significant wetlands and floodplains would be permanently lost to the local ecosystem. The reservoir would convert 1,526 acres of a generally undisturbed, high quality, highly diverse and productive system of wetlands, forests and streams and their wildlife communities into a relatively monotypic, open-water lake environment favored by only a few lake-dependent species.

Roughly half of the total 17 square mile drainage area (8.9 square miles) would be affected by the impoundment, and the flow pattern of Cohoke Creek would be significantly and permanently altered. The net reduction in freshwater discharge below the dam would restrict stream flows to about one third of the existing average flow and would result in adverse impacts to the wetland vegetation and the fish and wildlife that Cohoke Creek and Cohoke Millpond support. Such a disruption in flow and circulation patterns could also result in major wetland losses through secondary impacts. The impoundment would result in the permanent alteration and potential degradation of 186 acres of wetlands and their associated wildlife habitat downstream of the proposed dam due to decreased inflow to the downstream wetlands, and significantly reduced export of particulate organic matter (detritus) which would be expected to adversely affect the natural maintenance of the downstream system. Additionally, the proposed reservoir and pumpover are predicted to increase loading of dissolved nutrients (nitrogen and phosphorus) which could accelerate eutrophication of downstream reaches and result in depletion of dissolved oxygen and other water quality problems. These changes would be expected to adversely affect the biological productivity of the downstream wetland system.

The permanent conversion of 10.4 acres of forested wetlands to emergent and/or scrub-shrub wetlands along the pipeline construction route would result in a reduction of forest patch size and fragmentation of habitat for some interior forest species. Reduced habitat from forest fragmentation could result in decreased breeding success and an overall population reduction. In addition, further degradation of wildlife habitat would occur if these disturbed areas become dominated by more tolerant invasive species such as common reed (*Phragmites australis*.) Forest fragmentation would also decrease the habitat value of the remaining unaltered forest.

Another 0.15 acres of wetlands would be destroyed by the construction of the proposed outfall structure and excavation of a discharge channel on Beaverdam Creek. In addition, the sustained average 7-fold increase above existing flow conditions would adversely and permanently change stream dynamics. This change would increase erosion rates and result in wetland losses in the 0.8 miles of stream substrate below the outfall. Increased average stream flow conditions to 32.6 mgd would adversely impact wetland habitat, fish and benthic populations that are adapted to average flows of only 4.5 mgd.

The King William Reservoir itself could result in additional cumulative impacts through future expansion of the reservoir footprint. The City of Newport News has made plans to eventually expand the reservoir to either the KWR-II or the KWR-I dam location thereby impacting an additional 137 to 216 acres of

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wetlands to supply additional treated water and has reserved the lands between the KWR-II and KWR-IV dam sites for possible future downstream reservoir enlargement. Therefore, it appears that the City of Newport News intends to eventually apply for a permit to impact a total of 574 to 653 acres of wetlands for the King William Reservoir. These downstream wetlands closely resemble those in the proposed impoundment area and possess a high level of ecosystem diversity.

The withdrawal of 75 mgd of water from the proposed intake structure on the Mattaponi River has the potential to alter salinity gradients of the river water which would affect wetland vegetation. The proposed intake structure itself would alter current patterns and velocity and could increase erosion of wetlands along the shoreline. Although the increases in salinity and erosional effects are predicted to be small, these changes would have a long-term, additive effects on the diverse tidal freshwater marshes in the nearly pristine Mattaponi River and could irreversibly alter the natural habitat of freshwater plants and wildlife. The applicant's individual studies on salinity and erosion did not predict substantial direct impacts to the Mattaponi River and its resources from the single effects they evaluated. However, these studies revealed the lack of information concerning combined and indirect adverse impacts that would occur from the additive effects of these changes. The magnitude of these effects are unknown, and cannot be accurately predicted, especially in conjunction with other projects that may follow.

Mud Flats: No impacts are anticipated.

Vegetated Shallows: No impacts are anticipated.

Coral Reefs: No impacts are anticipated.

Riffle and Pool Complexes: No impacts are anticipated.

Subpart F - Potential Effects on Human Use Characteristics:

Municipal and Private Water Supplies: The proposed King William Reservoir project would be highly beneficial to Newport News Waterworks and their customers. As hosts for the project, King William County and New Kent County have the option to receive 3 mgd and 1 mgd from the reservoir storage, respectively, should they choose to purchase the water and construct the necessary pipelines, treatment plants and transmission infrastructure.

However, the needs of other localities within the Mattaponi and Pamunkey River basins have not been considered or provided for by the RRWSG's plan. King and Queen County and Caroline County in particular have expressed concern that the withdrawal of so much water from the Mattaponi River would preclude their being able to obtain future water supplies from the river when their need arises. Minimum instream flow conditions to preserve the quantity and quality of water for the maintenance of fish and wildlife resources could limit future withdrawals from the Mattaponi River.

Farmers who currently use Mattaponi River water for irrigation of their crops are concerned that any increase in salinity would make the water unusable for this purpose. Lateral seepage from the proposed King William Reservoir due to the rise in the water table could recharge the Yorktown aquifer and benefit local private wells.

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Recreational and Commercial Fisheries:

Mattaponi River - The taking of American shad is prohibited to the general public in the Mattaponi River and the upper portions of the Pamunkey River due to depletion of stocks by over-fishing and habitat degradation; however, shad are commercially fished in the Chesapeake Bay. The Mattaponi and Pamunkey Tribes hold tribal fishery rights and are exempt from the state closure. The reproductive viability of American shad is of particular concern because shad populations have slowly but steadily declined over the past 100 years. State and federal agencies are currently involved in conservation efforts to restore habitat and increase populations; and hatcheries operated by the Mattaponi and Pamunkey Tribes on their reservations contribute to this effort. Traditional fisheries management has not been effective in expanding the shad populations, and researchers have acknowledged that the complex interactions of the complete ecosystem must be taken into account, and the critical stages of the shad's life cycle must be examined to determine what types of habitat are essential to reproductive success.

Many members of the Mattaponi Tribe depend on fish from the Mattaponi River for both their subsistence and as a source of income; therefore, adverse effects to anadromous fish would affect the economy of the Mattaponi Tribe. Also, any adverse effects to the reproductive success in the Mattaponi and Pamunkey Rivers would affect the economy of those depending on the commercial harvesting of shad in the Chesapeake Bay.

The potential for saltwater intrusion to decrease the tidal freshwater zone of spawning habitat on the Mattaponi River could impact populations of American shad in the Mattaponi and Pamunkey Rivers. American shad spawn only in freshwater (less than 0.5 parts per thousand salinity); therefore, any salinity changes associated with the withdrawals could affect where and when these fish spawn in the River. Research has shown that full development of salinity tolerance does not occur until the onset of the larval-juvenile metamorphosis (26 to 45 days from the egg stage); therefore, there would appear to be the potential for a reduction in the survival, development and growth of early life stages of shad as a result of salinity changes in the Mattaponi River. Adequate stream flows and natural hydroperiods need to be maintained during the summer months to protect the riverine and riparian habitat for juvenile fish.

The intake operation could result in fish mortality from entrainment and impingement of fish eggs and larvae. Some eggs and larvae that are impinged on the intake screens will be damaged or destroyed. Some eggs and juveniles of other fish species and food particles that are smaller than the one-millimeter screen openings could be pulled into the intake. This could result in a reduction of food supplies that are necessary for the survival and growth of juvenile shad and other anadromous fish populations in the Mattaponi River.

According to Dr. Greg Garman, who performed a limited study of the potential effects of the proposed withdrawal on anadromous fish in the Mattaponi River, "With a few exceptions, there existed only a very limited amount of biological or ecological information that can be used to make direct judgments concerning the likely impacts of the King William Reservoir on the ecologically and economically important anadromous clupeid populations of the Mattaponi River." Dr. Garman further stated that without the availability of such basic descriptive information as temporal and spatial distribution, spawning and early life history stages, it was very difficult to accurately assess the potential for ecological impacts from the proposed project.

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Cohoke Creek - Limited fish surveys identified 38 species within the Cohoke Creek watershed.

Construction of the dam and inundation of the pool area would impact fish species in Cohoke Creek through increased levels of suspended sediment and the elimination of substrate, benthic food organisms and vegetation for spawning, nursery and shelter. As the reservoir would be stocked with forage and game species, it would provide increased opportunities for recreational fishing, but would result in a significant change in the composition of the fish assemblage. The extent to which extirpation of native fishes will occur is unknown; however, it can be assumed that the establishment of a stocked freshwater fishery would not compensate for the impacts of the project to resident fisheries as asserted by the RRWSG. Although some fish species may be able to persist in the reservoir, others that rely on the flowing creek system would be eliminated through its conversion to a deep-water lake.

According to Dr. Greg Garman, non-native fish stocked in the King William Reservoir would very likely escape into the Pamunkey River, and could eventually become established in the Mattaponi River. These non-indigenous fish could impact native fish in the rivers, including American shad, by predation and competition.

Construction of the King William Reservoir would permanently block the potential passage of spawning anadromous and catadromous fish into the upper 21 miles of Cohoke Creek effectively precluding the future restoration of potential anadromous fish spawning habitat in that section of the Creek. The 1987 Chesapeake Bay Agreement has placed a special emphasis on the removal of blockages to anadromous fish and restoring historic spawning grounds.

Water Related Recreation: The discharge of fill for the construction of the dam and backflooding of the pool area would eliminate areas where recreational hunting and fishing as well as non-consumptive recreational uses such as hiking and bird watching currently take place. Recreational fishing in the privately owned 85-acre Cohoke Millpond could be impacted by siltation during reservoir construction and by long-term changes in water quality and quantity as a result of reduced flows. However, the 1,526-acre King William Reservoir would provide substantial water-related recreational opportunities for fishermen, sail boaters, canoeists, bird watchers, photographers, sightseers, and hikers. The proposed King William Reservoir would become the closest large lake available to the residents of the Middle Peninsula and Northern Neck and would be expected to be a substantial recreational benefit to the region.

Aesthetics: The Cohoke Creek watershed is relatively undisturbed except for silvicultural activities and to some is considered to possess natural scenic beauty. A dramatic shift in the scenic character of the area would occur from the replacement of this forest/wetland system with a deep-water man-made lake. To those who enjoy the natural aquatic ecosystem, the reservoir would be considered an inappropriate development that would destroy the vital elements which contribute to the compositional unity, distinctiveness and diversity of the area. Also, the planned recreational and residential development in and around the reservoir would be considered by some as encouraging incompatible human access to an otherwise undisturbed area. From the unique perspective of the native Americans living in the area, the reservoir would reduce the spiritual value of the aquatic area and destroy the quality of life enjoyed by their people for centuries. However, because aesthetic values vary with individual taste, others would consider the new open-water habitat and recreational and residential uses as an aesthetic resource. Short-term water quality and air quality impacts would occur during land clearing and construction disturbances. Construction activities and transportation of workers and materials to the site would increase noise levels at the reservoir project site. A long-term increase in ambient noise levels would result from the operation of the reservoir pumping station. Odor would be a problem when the reservoir is severely drawn down and anaerobic sediments are exposed.

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According to The Nature Conservancy, the freshwater tidal ecosystem of the Mattaponi River is one of the most pristine on the Eastern Seaboard and it is considered by the Virginia Department of Conservation and Recreation to be one of the most significant natural habitats in the eastern United States. A segment of the Mattaponi River has been evaluated and determined to qualify as a Virginia Scenic River, and the state has determined that other segments should be evaluated to determine their suitability as a Virginia Scenic River. The Mattaponi River supports state-significant and exemplary freshwater tidal marshes and swamps and provides important habitat for rare species such as the sensitive joint-vetch and the bald eagle. The intake pump station structures and the surrounding cleared areas would disrupt the pristine nature of the shoreline when viewed from the river. Construction activities would temporarily increase noise levels, and the pump station operation would result in a long-term increase in ambient noise levels.

The Mattaponi Tribe has a unique cultural perspective of the Mattaponi River that goes beyond aesthetics. The Mattaponi people believe that the Mattaponi River is more than a simple body of water. To them, it is a spiritual place that unites tribal members through baptism and other religious ceremonies. The Mattaponi Tribe claims that alterations to the natural state of the river would compromise the sanctity of these religious ceremonies. They believe that the river is a gift of life from the Great Spirit that provides and completes the circle of life. The Tribe believes that to defile the Mattaponi River would be to dishonor the Tribe's ancestors and Mother Earth.

Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites and Similar Preserves: No impacts are anticipated.

Subpart G - Evaluation and Testing:

General Evaluation of Dredged or Fill Material: The proposed fill for the construction of the earthen dam would be obtained from soils in a borrow area adjacent to the proposed reservoir. This material would consist of sand and clay and is not likely to be a carrier of contaminants; therefore, no further testing is required. The proposed concrete and riprap structures at the intake and outfall locations would also be composed of naturally occurring and inert material unlikely to be a carrier of contaminants.

Chemical, Biological and Physical Evaluation and Testing: The dredged or fill material is unlikely to be a carrier of contamination and is, therefore, excluded from the evaluation procedures.

Subpart H - Actions to Minimize Adverse Effects:

Actions Concerning the Location of the Discharge: The location of the proposed dam was moved upstream twice, thereby reducing the wetland impacts on Cohoke Creek by a total of 216 acres. The outfall location was moved downstream another 0.5 miles, thereby reducing the impacted section of Beaverdam Creek streambed to 0.8 miles. Also, the pipeline route was realigned to reduce the number of wetland/stream crossings.

Actions Controlling the Material After Discharge: The applicant has proposed a riprap apron to prevent scour at the end of the outfall on Beaverdam Creek and riprap toe protection and landscaping of the dam on Cohoke Creek to reduce erosion of the earthen fill material.

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Actions Affecting the Method of Dispersion: The proposed intake structure on the Mattaponi River would be oriented parallel to the natural flow of the river to minimize the obstruction to water current or circulation patterns, thereby reducing turbulence and shoreline erosional impacts.

Silt curtains and diversion structures for stream crossings, and standard erosion and sedimentation control measures to minimize the adverse impacts associated with construction would be automatically included as special conditions of any Corps permit to confine suspended particulate materials and prevent point and non-point sources of pollution.

Actions Related to Technology: Wedge wire screens would be installed on the Mattaponi River raw water intakes as protective devices to reduce impacts to fish eggs and larvae. The pipeline crossing of the Pamunkey River would be accomplished by the directional drilling technique to reduce and/or avoid disturbance to the river bottom.

Actions Affecting Plant and Animal Populations: The dam location was moved 1.7 miles upstream of the original dam site in order to avoid direct impacts to a bald eagle nest and the outfall location was moved downstream 0.5 miles, thereby reducing the impacts to fish and aquatic resources. The intake was designed to incorporate wedge-wire screens with one-millimeter screen openings and entrance velocities not to exceed 0.25 feet per second to minimize entrainment and impingement of fish eggs and larvae. The operation and maintenance of intake screens would minimize the need for backflushing and use of chemicals to eradicate mussels.

The applicant has developed a wetland mitigation plan for replacement of wetlands that would be destroyed by the proposed discharge on a 2 to 1 acreage basis. A complete review of the plan indicates that the proffered acreage may fall short of full 2 to 1 replacement. In addition, the plan does not provide full in-kind replacement of the wetland functions that would be lost.

The Corps of Engineers does not have jurisdiction over the uplands that would be lost and cannot require mitigation for upland impacts as a part of the public interest review. However, the HEP and other functional assessments emphasize how the adjoining uplands complement the functions of the Cohoke Creek Wetlands. The applicant has included upland buffers in their wetland mitigation plan to partially offset the adverse impacts.

The applicant agreed to the Service's conservation recommendation of preserving a known colony of the federally listed threatened small whorled pogonia in order to minimize the impacts of the proposed action on the species. Six conservation recommendations were made by the Service in their Biological Opinion to protect the federally listed threatened sensitive joint-vetch populations that may be affected by the proposed action. The RRWSG agreed to only three of the conservation recommendations as they believe that the impacts to the sensitive joint-vetch habitat from the construction and operation of the intake at Scotland Landing would be negligible. Although the RRWSG originally proposed a management plan to minimize potential impacts to both existing and newly established nests of the federally listed threatened bald eagle during construction and operation of the pipeline and reservoir, there is no mention of these management measures in their Final Mitigation Program, Fish and Wildlife Mitigation Plan; therefore, it appears that the applicant no longer proposes these measures.

Actions Affecting Human Use: The applicant proposes to implement architectural and landscaping treatments that would minimize pumping noise and visual impacts at the raw water pumping station on

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the Mattaponi River. Also, upon completion of dam construction, the earthen structure would be landscaped to minimize visual impacts. In order to reduce damage to Mattaponi Tribal fishing nets from pleasure boaters on the Mattaponi River, the applicant offered to ensure that King William County would not include a boat ramp at their proposed recreation area on the remainder of the Mattaponi River pump station property.

Other Actions: The applicant has proposed a schedule for downstream releases from the dam that they believe would accommodate the needs of wetlands, fish and wildlife in Cohoke Creek downstream of the proposed dam. The applicant has proposed the use of the 40/20 Tennant Minimum Instream Flow Method that they believe would be protective of fish and wildlife resources in the Mattaponi River. The applicant has developed a wetland mitigation plan that they believe would more than offset the adverse impacts to wetlands in Cohoke Creek. While I consider these actions to be an impressive attempt to minimize some of the adverse impacts associated with the project, I do not agree that they would completely accomplish that goal. My concerns on the shortcomings of each of these plans and recommendations for improvements are contained elsewhere in this document.

The applicant participated in the development of a long-term River Monitoring Plan to analyze pre and post-construction conditions in the Mattaponi River and Cohoke Creek. The applicant participated in the Habitat Evaluation Procedures Study to quantify anticipated habitat impacts on the reservoir project site and to determine whether the proposed compensatory mitigation would offset the anticipated habitat impacts.

Subpart B - Compliance With the Guidelines:

Restrictions on Discharge:

Alternatives Restriction (§ 230.10(a)): No discharge of dredged or fill material into a water of the United States shall be permitted if there is a practicable alternative that would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences. Construction of the King William Reservoir dam in Cohoke Creek and its adjacent wetlands would constitute a discharge of fill material into a water of the United States. This Record of Decision has shown that other alternatives, or combinations of alternatives, would be practicable alternatives. These practicable alternatives would be reasonably available to the applicant and would satisfy the applicant's overall purpose (to satisfy the water supply needs of the localities in the Regional Raw Water Study Group service area through the year 2050.) These alternatives would also have less adverse impact on the aquatic ecosystem. As explained in the 6 February 1990 EPA/Corps Mitigation Memorandum of Agreement, "Compensatory mitigation may not be used as a method to reduce environmental impacts in the evaluation of the least environmentally damaging practicable alternatives for the purposes of requirements under Section 230.10(a)." Therefore, for this restriction, the environmental impacts of the proposed King William Reservoir project must be assessed without considering the applicant's compensatory mitigation plan. For these reasons, the King William Reservoir project fails the Alternatives Restriction.

Other Program Restrictions (§ 230.10(b)): No discharge of dredged or fill material shall be permitted if it causes or contributes to violation of any applicable state water quality standard, violates any applicable toxic effluent standard, jeopardizes the continued existence of any species listed as threatened or endangered under the Endangered Species Act of 1973, or violates any requirement imposed by the

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Secretary of Commerce to protect any designated marine sanctuary. The King William Reservoir passes the Other Program Restriction.

Significant Degradation Restriction (§ 230.10(c)): No discharge of dredged or fill material shall be permitted if it would cause or contribute to significant degradation of the waters of the United States. In the context of this restriction, effects contributing to significant degradation must occur in one or more specific areas, including: fish; wildlife; special aquatic sites (including wetlands); life stages of aquatic life and other wildlife dependent on aquatic ecosystems; aquatic ecosystem diversity, productivity, and stability; loss of fish and wildlife habitat; or loss of capacity of a wetland to assimilate nutrients. For purposes of the Significant Degradation Restriction, the net impacts of a project are assessed (including any compensatory mitigation). As stated in this Record of Decision, the applicant has proposed an impressive wetland mitigation plan and impacts to other resources would be reduced either by project modifications already agreed to by the applicant or that would be imposed as permit conditions. However, the wetland mitigation plan falls short of fully offsetting the project's impacts (see below). Although certain other impacts would also be reduced or offset, the overall effect of the project, from the standpoint of the factors listed herein and discussed elsewhere (including cumulative impacts as discussed in Section 13, above), would be to cause significant degradation to waters of the United States. The King William Reservoir project fails the Significant Degradation Restriction.

Minimization Restriction (§ 230.10(d)): No discharge of dredged or fill material shall be permitted unless appropriate and practicable steps have been taken to minimize potential adverse impacts to the aquatic ecosystem. The EPA/Corps Mitigation MOA specifies that "The determination of what level of mitigation constitutes "appropriate" mitigation is based solely on the values and functions of the aquatic resource that will be impacted." What is 'practicable', in this context, is what is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes. The wetland mitigation plan proposed by the applicant is the largest ever proposed in Virginia, but the King William Reservoir project would also constitute the largest wetland impact ever permitted in Virginia. The HEP study discussed elsewhere in this Record of Decision shows that the wetland mitigation plan would not appropriately mitigate the aquatic ecosystem habitat functions and values which would be lost due to the project. Also, this Record of Decision shows that there are uncertainties, risks, and other drawbacks to several of the proposed wetland mitigation areas, making their complete success uncertain. In addition, the applicant has proposed to preserve the 186 acres of wetlands downstream from the proposed dam as part of their mitigation plan, but has not agreed to protect this acreage by restriction or covenant from future degradation or destruction. Finally, impacts to Beaverdam Creek and its wetlands could be avoided by the practicable alternative of extending the pipeline and outfall into Diascund Reservoir. For each of these reasons, I find that appropriate and practicable steps to minimize potential adverse impacts to the aquatic ecosystem have not been taken. The King William Reservoir project fails the Minimization Restriction.

Factual Determinations (§ 230.11): In light of Subparts C through F, I have evaluated the potential short-term and long-term effects of the proposed discharge on the physical, chemical and biological components of the aquatic environment. I have considered the actions to minimize impacts (Subpart H) in making this determination. I have determined that both individually and cumulatively, the proposed discharge would cause or contribute to significant degradation of the waters of the United States. I have also determined that secondary effects associated with the discharge have the potential to result in significant degradation of the aquatic ecosystem.

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Findings of Compliance or Non-compliance with the Restrictions on Discharge (§ 230.11): I have determined that the proposal does not represent the least environmentally damaging practicable alternative as other practicable alternatives to the proposed discharge that would have less adverse effect on the aquatic ecosystem are available to the applicant. The proposed King William Reservoir project fails three of the four restrictions on discharge.

I have determined that the proposed discharge will result in significant degradation of the aquatic ecosystem under Section 230.10 (c). The aquatic resources that would be impacted by the proposed King William Reservoir have been identified as Aquatic Resources of National Importance (ARNI) by the U.S. Fish and Wildlife Service and EPA. The project would result in adverse effects to fish, wildlife and special aquatic sites, has the potential for significant effects on life stages of aquatic life and other wildlife dependent on the aquatic ecosystem, would have significant effects on the diversity, productivity and stability of the ecosystem, would represent a significant loss of fish and wildlife habitat and has the potential to significantly affect the economy of the Mattaponi Indian Tribe.

The proposed discharge does not include all appropriate and practicable measures to minimize potential harm to the aquatic ecosystem. The applicant has developed a wetland mitigation plan focusing on 2 to 1 acreage replacement; however, the plan falls short of the goal of in-kind replacement of wetland functions and may fall short of full 2 to 1 replacement as well. The applicant has agreed to many, but not all, of the recommendations of the District and the federal advisory agencies to avoid and minimize adverse impacts to fish and wildlife resources. I have determined that the proposed discharge would cause or contribute to significant degradation of the waters of the United States. Because of the individual and cumulative adverse environmental impacts associated with the project and the lack of need to destroy wetlands when viable alternatives exist, I have determined that the proposed discharge of fill material does not comply with the Environmental Protection Agency's 404 (b)(1) Guidelines.

22. Conclusions: I have found that the combined adverse impacts of the proposed King William Reservoir project would cause or contribute to significant degradation of the waters of the United States, including wetlands, specifically in Cohoke Creek and the Mattaponi River (40 CFR 230.10 (c)).

The proposed King William Reservoir would displace not only wetlands, but a complex landscape of wetlands and upland communities. The project would result in the irreversible and irretrievable loss of 403 acres of vegetated wetlands, 34 acres of shallow open water, 21 miles of free-flowing streams, and 1,089 acres of adjacent and interspersed upland habitat. The aforementioned aquatic resources have been identified as Aquatic Resources of National Importance (ARNI) by the U.S. Fish and Wildlife Service and EPA. A large, diverse complex of wetland and upland habitats including beaver ponds, highly productive emergent and scrub-shrub wetlands, stream bottom and riparian wetlands as well as areas of mature forest would be transformed into a monotypic lake environment favored by only a few species. The existing diverse habitat of the Cohoke Creek watershed supports a wide array of aquatic, semi-aquatic and terrestrial wildlife and the low-gradient system serves an important role in maintaining water quality. The RRWSG's claim that the Cohoke Creek wetlands are not valuable or highly diverse is contrary to the results of their own studies as well as the opinions of many experts. Functional assessments performed in support of the project have actually demonstrated that these wetlands provide services to the Cohoke watershed that cannot be replaced by the proposed offsite compensation or the reservoir itself.

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Approximately 1,526 acres of wildlife habitat within KWR-IV pool area would be converted to open water. Terrestrial and wetland-dependent wildlife would be affected by the inundation of wetland and forested areas. The reservoir would flood a 17-nest great blue heron rookery, numerous beaver ponds and large uninterrupted tracts of bottomland hardwood forests thereby eliminating feeding, breeding and migration habitat for wetland dependent species. Many species inhabiting the flooded area would be displaced to other areas of similar habitat, if available. If neighboring habitats are at or near their carrying capacity for a particular species, the competition for available food supply would result in malnutrition and mortality and an overall reduction of the population of that species in the area. Less mobile species and species dependent on large contiguous habitats would be the most affected by the reservoir construction. Reptiles, amphibians and some small mammals would be less likely to relocate unless suitable habitat is available immediately adjacent to the pool area. These individuals would not survive. Some aquatic fringe would most likely become established around the reservoir; however, the fringe would provide less diversity of habitat and would not replace the functions in the existing Cohoke Creek system. Furthermore, water level fluctuations and periodic drawdowns associated with reservoir operation would decrease the habitat value and use of the aquatic fringe by wildlife. Reduction in habitat would also affect temporary resident species such as neotropical migratory songbirds that rely on large areas of temperate forest for breeding. The primary adverse impacts to wildlife habitat from the construction of the reservoir would likely be followed by similar secondary losses of wildlife habitat from the planned residential and recreational development around the reservoir.

Roughly half of the total 17 square mile drainage area (8.9 square miles) would be affected by the impoundment and the flow pattern of Cohoke Creek would be significantly and permanently altered. The net reduction in freshwater discharge below the dam would restrict flows to about one third of the existing average flow and would impair the downstream transfer of sediments and detritus. The proposed reservoir and pumpover is predicted to significantly increase loading of dissolved nutrients (nitrogen and phosphorus) within the reservoir pool area and potentially downstream over current loading rates in the Cohoke Creek system. An additional 186 acres of seasonally-flooded to permanently-flooded wetlands between the currently proposed KWR-IV dam location and the upper reaches of Cohoke Millpond would be indirectly affected by reduced flows. These wetlands are supported by hydrologic input from above the proposed dam location and would change in character and/or be reduced in acreage by the almost two-thirds reduction in flow volume.

An estimated 10.4 acres of wetlands would be impacted along the pipeline construction route. Since reforestation of the pipeline right-of-way would be suppressed to provide maintenance access, palustrine forested wetlands along the pipeline would be permanently converted to palustrine emergent or scrub-shrub wetlands and could result in a reduction in forest patch size and fragmentation of habitat for some interior forest species. Reduced habitat from forest fragmentation results in decreased breeding success and an overall population reduction. The right-of-way would also allow the introduction of edge species, which compete with, or prey upon interior forest species. Furthermore, these disturbed areas may become dominated by more tolerant exotic and invasive species such as common reed (*Phragmites australis*), the establishment of which would further degrade the wildlife habitat.

Also, approximately 0.15 acres of wetlands would be impacted by the proposed outfall structure on Beaverdam Creek. Operation of the pumpover with a sustained average 7-fold increase above existing flow conditions in Beaverdam Creek would adversely and permanently change stream dynamics and stream morphology. Increasing the average stream flow conditions from 4.5 mgd to 32.6 mgd would generate unacceptable levels of sustained flow volume on downstream aquatic resources, including

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vegetated wetlands, fisheries and benthic populations. Sustained flow volumes would increase rates of erosion and subsequent deposition of highly erodible materials such as organics and silts, and would potentially decrease water quality downstream to Diascund Creek Reservoir. The relocated outfall structure could also adversely impact a nesting population of the great blue heron, a species protected under the Migratory Bird Treaty Act. Construction and operation of the outfall structure and channelization of 150 linear feet of vegetated wetlands directly beneath the small rookery could result in unnecessary and, therefore, unacceptable impacts to the rookery.

The RRWSG has attempted to show that their mitigation proposal would fully replace the lost functions and values; however, their documentation indicates that their plan would not meet full functional replacement. Even though the applicant has made an impressive effort to minimize and compensate for the wetland loss, the net loss would still represent a significant degradation to waters of the United States and a significant loss of wildlife habitat. I agree that if fully successful, the proposed plan would replace the acreage amounts of lost wetlands. However, I cannot agree that the proposed plan would fully offset all of the impacts associated with the loss of an integrated, mature wetland habitat such as is found in the Cohoke watershed. The mitigation sites may provide wetlands of the same Cowardin classification as the impacted areas, but they would mostly function as depressional wetlands supported by runoff and precipitation unlike the wetlands of the free-flowing riverine system in Cohoke Creek. Furthermore, the project represents the loss of not only wetlands, but also a complex landscape of wetlands and upland communities that form an entire ecosystem. It is not possible to replicate the ecology and diversity of an entire integrated system of wetlands, streams, ponds, and forests in scattered mitigation sites throughout several small watersheds. The functions and values of the complex mosaic of habitats that would be lost cannot be replaced in fragmented and segregated compensation sites, even at a 2 to 1 ratio.

Historically, many efforts to re-create wetlands, especially forested wetlands, have proven less than fully successful. Also, because forested wetlands take 20 to 40 years or more to mature and the source of hydrology may not be guaranteed for that length of time, it is not possible to accurately predict to what degree the mitigation areas would provide successful and appropriate compensation. Furthermore, I have found that the Final Mitigation plan could actually fall short by as much as 431 acres due to the questionable feasibility of the Townsend site, problems with the designs of the Terrell and Taliaferro sites, and due to changes in the conceptual plans that appeared in the Final Wetland Mitigation Plan for the Gulasky, Lanesville, and Meadow Farm C sites.

As a part of their mitigation plan, the RRWSG has offered to place temporary conservation easements over 186 acres of stream corridor wetlands and 620 acres of adjoining upland habitat located downstream of the proposed King William Reservoir dam and upstream of the existing Cohoke Millpond. However, the RRWSG has not agreed to preserve these areas in perpetuity and a clause in the City of Newport News' Development Agreement with King William County reserves the wetlands between the KWR-IV and KWR-II dam sites for future downstream enlargement of the reservoir. If permitted, a future reservoir expansion would destroy additional wetlands downstream of the currently proposed KWR-IV dam. Also, an additional 45 to 120 mgd pumpover from the Pamunkey River to augment the Mattaponi River withdrawal as described in the EIS should be viewed as a "reasonably foreseeable withdrawal" when considering long-term cumulative impacts to the York River system and its fish and wildlife resources from salinity intrusion. In the City's Development Agreement with King William County, a Pamunkey River pump station is included to provide a second pumpover to the proposed King William Reservoir as a way to enhance the safe yield of the reservoir and to supply additional water to as yet unidentified users. The combined effect of the proposed 75 mgd withdrawal from the Mattaponi River

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and the potential 45 to 120 mgd withdrawal from the Pamunkey River on the freshwater input to the Chesapeake Bay is also of concern.

In their Biological Opinion, the U. S. Fish and Wildlife Service concluded that neither the proposed action nor its cumulative effects are likely to jeopardize the continued existence of the two federally listed threatened plant species, the small whorled pogonia and the sensitive joint-vetch. However, a “no jeopardy” opinion does not mean that the proposed work will not affect listed species. Rather, it means that this one action alone would not lead to the extinction of the entire species, even though there may be harm, functional impairment or destruction of an individual population of the species. I disagree with the applicant’s contention that the small whorled pogonia no longer exists within the proposed reservoir pool area, and I have concluded that the proposal would result in direct adverse impacts to a colony of the small whorled pogonia which would be lost due to flooding. The applicant has agreed to the Service’s conservation recommendation for the small whorled pogonia. Also, the Service concluded that the project could result in detrimental effects on the sensitive joint-vetch colonies in the vicinity of the proposed raw water intake structure on the Mattaponi River and outlined six conservation recommendations to minimize or avoid adverse effects to these populations. The applicant has only agreed to implement three of the Service’s six conservation recommendations. With the exception of the number of colonies to be monitored, I agree with the need to implement all six of the Service’s conservation recommendations for the sensitive joint-vetch. I have concluded that without implementation of these recommendations, the construction and operation of the intake has the potential to result in indirect impacts to sensitive joint-vetch colonies in the vicinity of the intake.

During informal consultation for endangered species under Section 7 of the Endangered Species Act, discussions over management issues for the bald eagle took place between the applicant, the District and the Service. The Service had provided recommendations for reducing impacts to bald eagles and they were addressed by the applicant’s management plan contained in the District’s January 1998 Biological Assessment. In this plan, the RRWSG incorporated the Service’s recommendations to minimize potential impacts to both existing and newly established eagle nests during construction and operation of the pipeline and reservoir. Therefore, the Service indicated that their concerns over potential impacts to bald eagles were resolved through the informal consultation process, and the bald eagle did not need to be included in the formal consultation process. However, there is no mention of these management measures in the RRWSG’s October 1999 Mitigation Program, Fish and Wildlife Mitigation Plan. I have concluded that without implementation of these management measures, the construction and operation of the pipeline and reservoir may affect nests of the bald eagle and would require further consultation with the U. S. Fish and Wildlife Service under Section 7 of the Endangered Species Act.

However small the predicted increase in salinity and erosional effects may be, they would have a long-term, cumulative effect on plant and animal resources in the Mattaponi River and would alter the natural habitat of freshwater plants and wildlife on which the Mattaponi Tribe depends for their livelihood. The magnitude of these effects is unknown, and cannot be accurately predicted, especially in conjunction with other projects that may follow. While the applicant’s individual studies on salinity and erosion do not predict substantial direct impacts to the Mattaponi River and its resources, I disagree that these limited studies of single effects justify the RRWSG’s broad conclusions, especially since they do not account for the additive effects of these changes.

The project has the potential to result in ecological impacts to anadromous fish populations in the Mattaponi River. According to the RRWSG’s own consultant who performed the limited study of the

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potential effects of the proposed withdrawal on anadromous fish in the Mattaponi River, “With a few exceptions, there existed only a very limited amount of biological or ecological information that can be used to make direct judgments concerning the likely impacts of the King William Reservoir on the ecologically and economically important anadromous clupeid populations of the Mattaponi River.” Despite a lack of such basic descriptive information on temporal and spatial distribution, spawning and early life history stages of American shad in the Mattaponi River, the RRWSG has concluded that there would be no significant effect. I disagree and concur with the U. S. Fish and Wildlife Service that the project could seriously impact American shad. The applicant's limited study concluded that there would not be significant and detrimental impacts to migratory fish populations in the Mattaponi River as a direct result of the construction and operation of the King William Reservoir. However, the study did not consider the potential for indirect ecological effects as the result of physicochemical changes on fish assemblages.

Disruption of the Mattaponi Tribe's shad fishery and hatchery operation would represent a major cultural loss and a potential economic loss to the Tribe. It is true that despite the best efforts of the state and the Tribes, the shad population may continue to decrease even without the proposed water withdrawal for the reservoir. However, it must be taken into account that the complex interaction of numerous chemical and physical effects including the small increase in salinity that would result from the removal of up to 75 mgd of freshwater from the Mattaponi River has the potential to further degrade the already depleted shad population. As the Mattaponi Tribe depends on these fish for their livelihood, I cannot justify the further degradation or potential loss of this resource.

Because of the project's potential to impact these resources, the District staff developed monitoring protocols that would be included as a condition of a permit, if one were to be issued, to provide long-term data gathering and analysis. Conclusive evidence would not be available until the various monitoring efforts and studies had been completed many years after the project is built. However, no matter how thorough such a monitoring plan may be, and how rapid the response to correct a problem that arises, some effects may not become apparent until the damage is already done and some adverse impacts may be irreparable.

I have determined that the applicant's proposed use of the 40/20 Tennant Minimum Instream Flow Method would not be sufficient to eliminate impacts to anadromous fisheries, wetlands, threatened species or water quality. Therefore, I have determined that it would be prudent to require the more protective Modified 80% Exceedence for the withdrawal rules in the Mattaponi River if a Corps permit were issued.

There would be no adverse impacts to navigation in the Mattaponi River and the King William Reservoir would provide a net benefit to recreational boating in King William County. Recreational boating and fishing opportunities would be increased by the presence of a 1,526-acre man-made lake. The proposed reservoir would become the closest large lake available to the residents of the Middle Peninsula and Northern Neck and would be expected to be a substantial recreational benefit to the region. However, as there are already many other opportunities for recreational boating and fishing in the area, I do not find this factor particularly persuasive.

The project would adversely affect 115 archaeological sites, 72 to 79 of which are potentially eligible for inclusion in the National Register of Historic Places. The reservoir would be located between Virginia's only two American Indian Reservations, and the proposed intake would be constructed approximately

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three miles upstream of the Mattaponi Reservation. The project has the potential to impact a sacred site, traditional hunting, fishing, trapping, gathering and religious practices, subsistence fisheries, and the way of life of the Mattaponi, Pamunkey and Upper Mattaponi Indian Tribes.

The construction of the reservoir would result in a direct loss of hunting, trapping and gathering habitat and indirect impacts to the remaining area for game from overcrowding and competition for food. The increased recreational activities provided by the man-made lake and the planned residential and light commercial construction around the reservoir would result in a secondary loss of habitat on which traditional tribal uses would occur. This development would further reduce the land available to the tribes for hunting, trapping and gathering and additional recreational boat traffic on the Mattaponi River would interfere with traditional net fishing. The Mattaponi and Pamunkey Tribes have a spiritual connection to the Rivers, which are not only vital to their economy but are essential to their historical and cultural identity. The importance of the natural resources of Pamunkey Neck to the livelihood of Native Americans emphasizes the significance of the impacts.

Construction of the proposed King William Reservoir project would have a combined adverse impact on the natural and physical environment that would significantly and adversely affect the Mattaponi, the Upper Mattaponi and the Pamunkey Tribes. The cultural, social, economic and ecological impacts to the Tribes are interrelated to the adverse impacts to the natural and physical environment that would result from the project. The overall environmental effects of the project would be significant and would have an adverse impact on the Tribes that appreciably exceeds the effects on the general population. Therefore, the project would result in disproportionately high and adverse environmental effects to this minority population as described by Executive Order 12898. I have concluded that the risk to the culture and economy of the tribes, and to the Mattaponi Tribe in particular, would be significant. The Tribes cannot be fully compensated for the losses to their spiritual connections, culture and traditional socioeconomic practices that they would experience as a result of the construction of the reservoir and the withdrawal of water from the Mattaponi River.

The Corps' Institute for Water Resources concluded that unless the region suffers a drought more severe than any recorded in the twentieth century, the RRWSG has enough water through about 2015 even without using drought curtailment or dipping into the lower third of their existing reservoir storage. Therefore, there is no risk of shortage through 2015 with existing supplies. The IWR panel estimated that using 33% dead storage and no drought curtailment, the region will need more water beyond 2015 in order to have a zero risk of shortage. By 2020, there is a less than 4% risk of a maximum 11 mgd shortage if water use is the highest expected, groundwater yields are the lowest expected, and there is a recurrence of the worst drought of the twentieth century. By 2030, the risk is about 7% for a maximum 17 mgd shortage. The risk increases to 12% for a maximum shortage of 25 mgd by 2040. In the year 2050, there is about a 17% risk of a maximum shortage of 32 mgd of water. The risk of shortage means the risk of needing to use drought curtailment, not that the region would run out of water.

Newport News Waterworks' proposal to cease withdrawals at 33% of total storage volume in their existing reservoirs is arbitrarily and unnecessarily conservative, and unreasonably inflates their apparent deficit. Newport News Waterworks would use drought curtailment if needed during a drought as they have in the past and as any prudent utility would. Building the King William Reservoir would likely push the need for doing so again far into the future (barring emergencies), but at a significant environmental, social, and economic cost. I acknowledge the Virginia Department of Health's policy that utilities should not include drought curtailment when calculating the capacity of their supply systems, and that this policy

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would preclude Newport News from using IWR's drought curtailment scenario (as discussed above) to determine the 'official,' or rated capacity of their system. Although I have not relied on the drought curtailment scenario to justify my permit findings, I cannot ignore the reality that drought curtailment would be invoked if needed and would extend the capacity of Newport News' current system.

If Newport News Waterworks would use the existing reservoir storage volume of 5.5 mgd (at 25%), 8.9 mgd (at 20%) and 14.1 mgd (at 12%) in their calculation of safe yield, they would not need that same amount of safe yield from another future source, including additional storage space in a new reservoir. Utilizing as little as the 5.5 mgd of dead storage between 33% and 25% to calculate safe yield would reduce the risk of shortage to 1% by 2020, to less than 4% by 2030, to less than 8% by 2040, and to 13% by 2050. If Newport News Waterworks would utilize the 8.9 mgd of reservoir dead storage between 33% and 20% to calculate safe yield, there would be no risk of shortage by 2020, the risk of shortage would be reduced to less than 2% by 2030, to less than 4% by 2040, and to 8% by 2050. By using the 14.1 mgd of dead storage between 33% and 12% in their calculation of safe yield, there would be a less than 1% risk of shortage by 2030, a less than 2% shortage by 2040 and a less than 5% shortage by 2050.

I also believe that the 2 to 6 mgd of water from James City County's proposed groundwater desalination plant should be considered as a reasonably foreseeable future water supply and taken into consideration in the region's water supply planning. I also believe that the RRWSG has underestimated the expected yield of the aquifer. Yield from the James City County desalination plant would postpone the need by a few additional years depending on how much of the potential 6 mgd yield is actually realized.

Therefore, I have determined that the RRWSG will have no risk of shortage through the year 2015 with existing supplies. If water use is the highest expected, and if groundwater yields are the lowest expected, and if there is a recurrence of the worst drought of the twentieth century), there is a less than 4% risk of a maximum 11 mgd shortage by 2020. The entire 11 mgd shortage calculated for 2020 could be satisfied by using the existing reservoir storage volume and the yield from the James City County desalination plant, and the region would have only a very small risk of shortage by 2030. Each additional 5 mgd supply increment (from some other sources) significantly decreases the risk of future shortage. I find that the RRWSG would not need any new water supply, let alone a new reservoir until after about 2030.

I acknowledge that it is reasonable for water supply planners to look many years into the future when designing new water supply sources, especially when reservoirs and pipelines can take a long time to construct. Determining the best time to begin construction on a new water project is a matter of judgment, involving consideration of risk of shortage, project costs, financial impacts, shortage costs, hardships to users and numerous uncertainties with respect to alternative strategies. The IWR panel suggested using Strategic Trigger Planning as their planning criterion to allow the RRWSG to make minimal investment for expansion and to determine when additional need warrants the next incremental investment.

Since there is no immediate risk of a shortage, and when it does occur, the risk of a shortage occurring would be so low, it is not reasonable to build such an environmentally damaging project to satisfy a need that may never materialize. It would be more prudent to accurately assess need, and plan ahead when appropriate to address that need. The RRWSG's need for additional water supply to eliminate all risk of shortage becomes more certain and more critical in about the year 2025. There are other alternative sources to meet any shortage when it occurs, either implemented incrementally or as a one-time project. In the event that Newport News will actually need more water sooner than IWR predicts, these same

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alternatives could be implemented at an earlier date. The risk to the environment, the risk to an entire watershed and the risk to the continued way of life of Native Americans in the Pamunkey Neck area, especially the Mattaponi Tribe, are too great when weighed against the unjustified need based on my interpretation of the IWR panel's report.

The RRWSG has not demonstrated a sufficient need at this time for additional water supply and has not demonstrated that the proposed King William Reservoir would be the only alternative to meet that need when it does occur. Based on the results of the IWR report, there does not appear to be a persuasively demonstrated need for the destruction of 437 acres of wetlands/shallow open water habitat and the functions they perform as well as the loss of this ecosystem in order to meet this very small deficit in the region's future water demands. Furthermore, the proposed mitigation plan cannot adequately replace the wetland functions, contiguous habitat and wetland types that would be impacted by the project. The productive and diverse wetland system of the Cohoke Creek valley is a valuable public resource that should not be destroyed without an overriding public need. Wetland losses must first be avoided, then minimized and finally unavoidable wetland losses must be mitigated. While mitigation for wetland losses must be planned and considered in the evaluation of a permit application, whether adequate compensation can be accomplished is not a consideration in determining if the proposed project represents the least environmentally damaging practicable alternative. If there is no demonstrated need for the loss, then the loss is avoidable and no amount of wetland mitigation can compensate for the loss.

Other practicable alternatives (as discussed in Sections 7 and 10) are available to the City of Newport News to reduce their risk of shortage when the need does occur (groundwater, desalination, use of dead storage below 33%, drought curtailment, etc.). Also, the potential exists to further reduce the RRWSG's projected need by adopting water conservation incentives and by encouraging non-potable reuse of wastewater. New and constantly improving technologies are making other water supply options as feasible and cost effective as reservoirs have traditionally been. Therefore, I find that it is inappropriate to assume that only the proposed King William Reservoir has the potential to meet the applicant's future water supply needs.

23. District's Recommendation: I have determined that the decision on this project is a major federal action significantly affecting the quality of the human environment and I have evaluated, in light of the total public interest, all available information pertaining to the subject application. This determination is based on full consideration of information contained in my Draft, Supplemental and Final Environmental Impact Statements, and comments received from federal, state and local agencies and the general public as well as all subsequent information provided by the applicant. My recommended decision reflects the national concern for both protection and utilization of important resources and is based on an evaluation of the probable impacts, including cumulative impacts, of the proposed activity and its intended use on the public interest. The benefits which may reasonably be expected to accrue from the proposal were balanced against its reasonably foreseeable detriments (33 CFR 320.4 (a)). This review required an evaluation of the project under NEPA, and for consistency with the 404(b)(1) Guidelines. The 404(b)(1) Guidelines require an evaluation of all primary and secondary impacts of a project on the aquatic environment (40 CFR 230.11(h)); and NEPA requires an evaluation of all direct, indirect and cumulative effects of a project on the environment (40 CFR 1508.8).

The Corps regulations at 33 CFR 320.4(j)(4) state: "In the absence of overriding national factors of the public interest that may be revealed during the evaluation of the permit application, a permit will generally be issued following receipt of a favorable state determination, provided the concerns, policies,

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goals and requirements as expressed in 33 CFR Parts 320-324, and the applicable statutes have been considered and followed: e.g., the National Environmental Policy Act; the Fish and Wildlife Coordination Act; the Historical and Archaeological Preservation Act; the National Historic Preservation Act, the Endangered Species Act, the Coastal Zone Management Act, the Marine Protection, Research and Sanctuaries Act of 1972, as amended, the Clean Water Act, the Archaeological Resources Act and the American Indian Religious Freedom Act.”

The Commonwealth of Virginia has issued a Virginia Water Protection/401 Water Quality Certification for the King William Reservoir and the Governor of Virginia has urged me to issue a permit as well. However, I have determined that the concerns, policies, goals and requirements of several of these listed statutes would not be met if a Department of the Army Permit was issued for this project. It should be noted that many of the review factors considered by the Corps of Engineers are not the same as those considered by the state; therefore the outcome of federal and state reviews can be quite different. In addition to evaluating the project in light of all applicable federal laws and regulations, I must conduct a public interest review and alternatives analysis that balance the need for the project against its adverse environmental impacts.

In accordance with 33 CFR 320.4(b)(4), “No permit will be granted which involves the alteration of wetlands identified as important by paragraph (b)(2) of this section or because of provisions of paragraph (b)(3) of this section unless the district engineer concludes, on the basis of the analysis required in paragraph (a) of this section that the benefits of the proposed alteration outweigh the damage to the wetlands resource.” The wetlands in the Cohoke Creek valley perform many of the functions considered important to the public interest listed in 33 CFR 320.4 (b)(2) and have been identified by the EPA and the U. S. Fish and Wildlife Service to be an Aquatic Resources of National Importance (ARNI). The remaining wetlands in the Cohoke Creek valley downstream of the proposed dam would continue to perform some of these functions, but to a lesser extent, since they would be impacted by decreased stream flows, sediment deprivation, severed detrital link between the headwaters and downstream reaches, and increased loading rates of dissolved nutrients within the reservoir pool area. Also, these wetlands would be under threat of destruction from future expansion of the reservoir to the applicant’s preferred dam location at KWR- II.

In accordance with the Environmental Protection Agency’s Section 404(b)(1) Guidelines, “Except as provided under Section 404 (b)(2), no discharges of dredged or fill material shall be permitted which will cause or contribute to significant degradation of the waters of the United States.” (40 CFR 230.10(c)); and “....no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequence” (40 CFR 230.10 (a)). The proposed King William Reservoir project would cause or contribute to significant degradation of waters of the U.S. and other practicable alternatives are available to meet the applicant’s need for additional water supply when it arises. Therefore, the individual and cumulative damages to the wetland resource outweigh the benefits of the proposed filling to the applicant.

While the cost to the environment of providing more water than the RRWSG needs at this time are too high, it is reasonable and appropriate for me to consider what would happen if the risk of shortage is as great as reported by the RRWSG. I acknowledge that the costs to the RRWSG of providing too little water are also high. As stated in 33 CFR 320.4 (m), “Water is an essential resource, basic to human survival, economic growth and the natural environment.” However, this section goes on to state, “Water


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conservation requires the efficient use of water resources in all actions which involve the significant use of water or that significantly affect the availability of water for alternative uses including opportunities to reduce demand and improve efficiency in order to minimize new supply requirements.” If deficits were to develop more quickly than I anticipate, one or more of the incremental alternatives discussed in Sections 7 and 10 (groundwater, desalination, use of dead storage below 33%, drought curtailment, etc.) could be called upon to solve this problem more quickly and less expensively than the proposed King William Reservoir. Indeed, I find this to be both the environmentally preferred alternative (under NEPA) and the least environmentally damaging, practicable alternative (under the 404(b)(1) Guidelines), because of its inherent flexibility and its low environmental costs.

The applicant has not demonstrated a sufficient need for the project and I have determined that other less environmentally damaging practicable alternatives to the proposed King William Reservoir are available to the applicant to meet their actual need, when it does occur. I have found that the issuance of a permit for the destruction of 437 acres of ecologically significant wetland/open water habitat would neither be the environmentally preferred alternative, nor would it be the least environmentally damaging practicable alternative. I concur with EPA, the U.S. Fish and Wildlife Service and others regarding the anticipated environmental losses; and I agree that not all of these losses could be fully mitigated. I have weighed the actual need against the direct and indirect environmental consequences of the proposed project, and I have determined that the adverse impacts would not be justified.

I find that the King William Reservoir project has the potential to result in significant direct, indirect, and cumulative effects as defined by NEPA, and in significant primary and secondary effects as defined by EPA’s 404 (b)(1) Guidelines. I have determined that both individually and cumulatively, the proposed discharge would cause or contribute to significant degradation of the waters of the United States. I have determined that the issuance of a permit would be contrary to the public interest because of the unnecessary loss of wetlands and the potential for significant environmental degradation; and I find that the proposed discharge of fill material does not comply with the Environmental Protection Agency’s 404 (b)(1) Guidelines. Therefore, my decision is to recommend to the Commander of the North Atlantic Division that the application for the proposed King William Reservoir be denied.

20 MARCH 2001
Date


Allan B. Carroll
Colonel, U. S. Army
District Commander

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